

Municipal Journal

Volume XXXIX

NEW YORK, DECEMBER 30, 1915

No. 27



HALF-CIRCLE CULVERTS AT INTERSECTION OF SOUTH AND HANOVER STREETS.
Laid with concrete bottom, and concrete pavement two inches thick over the crown.

BRICK PAVEMENT CONSTRUCTION BY DAY LABOR

Complete Data Concerning Methods Employed, Amounts of Materials and Labor Used, and Itemized Costs of Three Jobs by City Forces in Carlisle, Pa.—Timekeeping System—Saving Estimated.

By JOHN C. HITESHEW.*

During the present season 12,846 square yards of brick pavement were laid by the Street Department of Carlisle, Pa., by day labor under the supervision of the writer; 11,929.5 square yards with concrete base and 916.5 square yards on old macadam base.

The work comprised three separate jobs. One on North Hanover street, between Presbyterian Church avenue and North street, comprising 5,675 square yards. South Hanover street, between Pomfret and South streets, 3,611 square yards; and West High street, between Pitt and West streets, of 3,559.4 square yards; each including intersection of cross streets at each end of block paved.

The costs and methods of each job will be given separately, excepting conditions which apply to all jobs.

N. HANOVER STREET.

Grading: The macadam surfacing of the old street was "spiked" with a thirteen-ton steam roller to facilitate picking and shoveling, excavated 9½ inches to sub-

grade, and thoroughly rolled. After rough grading had been completed to within a few inches of sub-grade, spikes were set across the half-section of street (as one side of street was completed before the other was started), every six feet and along the street every sixteen feet, after which neat grading was done, and then rolled to sub-grade.

The tracks of the Valley Railways Company are on this street. The Traction Company did its own grading, concreting between and eighteen inches on each side of their rails, and the borough laid cushion and brick, grouted, etc., at the expense of the Traction Company.

Concrete Base: The concrete base was four inches thick and proportions 1:3:6. Concrete stakes were placed after sub-grade had been rolled, and the concrete surfaced by pulling off with 2-in. by 4-in. straightedge, along 2-in. by 4-in. timbers eighteen feet long which extended between stakes that were set for top of concrete. After section across one half of street had been

*City engineer of Carlisle, Pa.

placed, the 2 by 4's were moved ahead and concrete shoveled into opening left by 2 by 4's, and the whole thoroughly rammed.

A one-bag mixer known as a "Wonder Ten," with power charger and automatic water tank, was purchased by the city for this work, but was not delivered until this job was half completed, before which we hired a mixer from a local concrete contractor. The concrete gang consisted of the following men: Man operating mixer, cement man, three stone wheelers, one sand wheeler hauling heaped barrow, four concrete wheelers; on the placing end, four men, two pulling off, one shoveling, and one tamping. Average amount of concrete placed per ten-hour day was 400 square yards.

Sand Cushion: A sand cushion $1\frac{1}{2}$ inches thick was laid on the concrete as soon as hard enough to walk on. Spikes were driven into the concrete stakes extending 2 inches above top of concrete, allowing for compression to $1\frac{1}{2}$ inches. The sand cushion was pulled off in the manner illustrated in the photograph. The cushion was then rolled with a 250-pound lawn roller drawn by hand. Average cushion laid per ten-hour day, 578 square yards.

Laying Brick: The brick was laid by two men with a third man filling in ends of courses. Our best brick layer previous to this year had never laid a brick but had had charge of the concrete mixer; but after experimenting with a "wonder," a colored man who claimed he could lay from 30,000 to 35,000 brick in ten hours (he could do it, but most of the brick he laid had to be relaid), we gave our mixer-man a chance to lay brick. By actual count he laid seventy brick in one minute, but of course he could not keep this up owing to lost time in straightening up line, walking back to beginning of courses, etc.; but he is an excellent workman. A carrying gang averaging from twelve to fifteen men supplied the brick layers. An average of 720 square yards, or about 30,000 blocks, were laid in a ten-hour day. Fire-clay paving block furnished by the American Sewer Pipe Company were used.

Rolling Brick: Brick was rolled with a five-ton tandem steam roller.

Grouting: Brick was sprinkled and grout of proportions 1:1½ cement and sand applied. There were two applications; the first, thin, was applied for a distance of about seventy-five feet and then followed by a thick creamy mix.

All grouting was applied with a concrete mixer, at first a "Standard" and later on a "Wonder Ten." The grouting gang consisted of man on mixer, cement man, two sand wheelers, four or five sweepers, and three squeegee men. Average grouting yardage for ten-hour day, 1,800 square yards.

Expansion Joints: "Elastite Sandwich" joints were used, longitudinally $1\frac{1}{4}$ inches thick, and transversely a $\frac{3}{4}$ -inch joint every 75 feet.

At this point the writer desires to state why he strongly advocates transverse expansion joints. In the first place, from actual experience he has noticed that within a few weeks, in hot summer weather, the $\frac{3}{4}$ -inch transverse joints have pushed out for several inches on each side of the joint proper, showing that there is expansion longitudinally as well as transversely. Again with transverse joints every 75 feet you have a 75-foot slab, and in many instances of pavements inspected which have a great many longitudinal cracks, had there been a transverse joint the crack might only have gone a few feet, certainly not more than 75 feet, and then stopped. Otherwise, a crack once started it is hard to tell just where it will end. In his own work, laid without a concrete base and with 14 inches fall from center

line of the street to gutter, the writer has seen a large crack appear the year following construction that, had an extra joint been placed in that section, would have undoubtedly stopped there, but as it was it continued for the full 75 feet. Among the objections I have heard regarding transverse joints is that the bricks "cut out" and wear round on each side of the joint, but so far we have had no trouble from that source, and I doubt if we will have. A question which always arises in my mind concerning transverse joints is, if the brick pavement expands transversely on a street from 30 to 100 feet wide, why wouldn't it expand longitudinally in one-half mile or five miles?

Sand Covering: When the grouting had set sufficiently that the moisture in it would not be absorbed by the sand, $\frac{1}{2}$ inch of sand was spread uniformly over the pavement.

One of the many worries of paving construction by day labor is the keeping of traffic off of the work, both while construction is going on and after grouting has been completed. We have finally cut the time for grout to set to five days and insist on that length of time, and more if weather is cool or during rainy season. However, our worst trouble was with the Traction Company, which, in concreting their own work, would keep the cars off for five days, but thought it was unnecessary to keep their cars off longer than a day after grouting, and after every grouting it was the same argument, telling them why it was absolutely necessary for them to stay off at least five days.

S. HANOVER STREET.

With few exceptions, details of construction were the same as on North Hanover street.

At Hanover and South streets two old iron-plate culverts across Hanover street were replaced by two half-circle corrugated culverts (see photograph) with concrete bottom, one on each side of the street, one 18 by 36-inch and one 12 by 24-inch. Over the larger culvert two inches of reinforced concrete was placed, as bricks would have reduced the clearance necessary to take care of the storm water.

The pavement immediately adjoining the intersections of curb lines was made flush, that is, there was no step, and water was diverted either way from intersection to inlets at building lines.

Grading on this job very nearly balanced, owing to raising of trolley tracks from six to thirteen inches, so that very little material had to be hauled off the street.

On both sides of the street there formerly were very deep and dangerous brick gutters, and to have constructed uniform 6-inch gutters would have necessitated a storm sewer along each side of the street to South street, which is already overtaxed during flood period. However, the water was diverted down Pomfret street, thereby relieving conditions at South and Hanover streets and at the same time using a more logical course for the water.

It must be understood that in towns of this size it is impossible to finance the building of sufficient storm sewers, the lack of which necessitates the carrying of practically all storm water on the surface, causing much annoyance and in many cases sacrificing the appearance of the street.

WEST HIGH STREET.

On this job there were 2,580.7 square yards of concrete base and 916.5 yards of macadam base. Council desired wherever possible to use the old macadam base, as has been done in former years with remarkable success; but good construction demanded that only 916.5 yards of the street be constructed in that manner.



SPREADING, STRIKING OFF AND ROLLING SAND CUSHION.

The sand cushion was spread by shovel, leveled off to 2 inches thickness by drawing a 2 x 4 straight-edge over 2 x 4 timbers, and then rolled to 1½ inches thickness, using a 250-pound lawn roller. Stakes were driven before concrete was placed, to give grade of concrete surface. After concrete had set, spikes were driven into tops of stakes to give grade of top of sand cushion. Bricks are shown standing behind these spikes.



LAYING BRICK. THREE LAYERS, EACH LAYING FOUR ROWS.

Twelve men carrying four bricks each to layers. Three rows of longitudinal bricks laid along gutters first. One half of pavement is laid at a time while other half is left open for traffic.



GROUTING. GROUT MIXED BY MACHINE, BROOMED IN AND SQUEEGEED.

Two applications of grout are made; the first thin, followed by a creamy mix. The photograph shows four grout sweepers and, in the background, three men with squeegees flushing the joints and striking off a smooth surface.

ITEMIZED COST OF BRICK PAVING IN CARLISLE, PA.

Date of beginning and finishing.....	N. Hanover St. April 19 to June 15.				S. Hanover St. June 15 to July 26.				W. High St. Sept. 27 to Nov. 17.			
	Area, square yards..... 5,675.62 534.13 52.97 ft.				Area, square yards..... 3,611 326.27 55.29 ft.				Area, square yards..... 3,559.4* 283.87			
Items.	Rate.	Number.	Cost.	Number.	Cost.	Number.	Cost.	Number.	Cost.	Number.	Cost.	Number.
Unloading, hauling and stocking brick:												
Foreman	\$0.154 per hr.	159 hrs.	\$24.48	119 hrs.	\$18.33	85 hrs.	\$7.00†	85 hrs.	\$7.00†	85 hrs.	\$7.00†	85 hrs.
Labor .....	.15 " "	1246	186.90	982	147.30	897	143.55	897	143.55	897	143.55	897
Labor .....	.10 " "	383	95.75	5	.50	233½	108.88	233½	108.88	233½	108.88	233½
Cart .....	.25 " "	60	9.00	51	7.65	5	.75	5	.75	5	.75	5
Team .....	.10 " "	62	6.20	69	6.90	7½	.75	7½	.75	7½	.75	7½
Total, unloading, hauling and stacking brick			322.33		267.18		260.43		260.43		260.43	
Cost per sq. yd. ....			.0567		.0740		.0731		.0731		.0731	
Grading and rolling with 13-ton roller:												
Foreman .....	.192 " "	242	46.46	117	33.98	230	46.00†	230	46.00†	230	46.00†	230
Labor .....	.25 " "	3836	575.40	1488	223.20	2252½	337.88	2252½	337.88	2252½	337.88	2252½
Labor .....	.10 " "	70	17.50	141½	14.15	67	6.70	67	6.70	67	6.70	67
Roller engineer .....	.25 " "	70	17.50	18	4.50	72	18.00	72	18.00	72	18.00	72
Roller .....	.60 " "	1235	308.75	494	123.50	656	164.00	656	164.00	656	164.00	656
Cart .....	.25 " "	7½	2.62			2	1.00	2	1.00	2	1.00	2
Team .....	.35 " "	68	10.25			42	6.30	42	6.30	42	6.30	42
Team .....	.10 " "	28	2.80	19	1.90	58	5.80	58	5.80	58	5.80	58
Total, grading and rolling			963.78		401.23		589.43		589.43		589.43	
Cost per sq. yd. ....			.1970		.1290		.1895		.1895		.1895	
Concrete base:												
Foreman .....	.192 " "	134	25.73	93	17.86	79	15.80†	79	15.80†	79	15.80†	79
Labor .....	.25 " "	1817½	272.63	1097	164.55	1003	150.45	1003	150.45	1003	150.45	1003
Labor .....	.10 " "	119	29.75	80	20.00	115	28.75	115	28.75	115	28.75	115
Cart .....	.25 " "	7	2.45									
Team .....	.15 " "	76	12.10	99	14.85	62½	9.35	62½	9.35	62½	9.35	62½
Team .....	.10 " "	149½	14.95	81	8.10	19	1.90	19	1.90	19	1.90	19
Mixer (hired) .....	.65 " "	72	46.80									
Mixer (own) .....	.30 " "	61½	18.45	91	27.30	76½	22.95	76½	22.95	76½	22.95	76½
Man on mixer .....	.25 " "	61	15.25	91	22.75							
Total labor			438.11		275.81		250.66		250.66		250.66	
Cement	\$1.05 per bbl.	575½ bbl.	604.27	362.75 bbl.	380.93	280.25 bbl.	294.26	280.25 bbl.	294.26	280.25 bbl.	294.26	280.25 bbl.
Sand	1.50 per ton	360.64 t.	540.90	248.42 t.	372.63	175.45 t.	263.17	175.45 t.	263.17	175.45 t.	263.17	175.45 t.
Stone .....	.65† per c. y.	507.4 c. y.	329.81	315.17 c. y.	204.86	250.0 c. y.	187.50	250.0 c. y.	187.50	250.0 c. y.	187.50	250.0 c. y.
Gasoline .....	.16† per gal.	12 gal.	1.92	13 gal.	1.69	15 gals.	2.55	15 gals.	2.55	15 gals.	2.55	15 gals.
Total, materials			1476.90		960.11		747.48		747.48		747.48	
Total, concrete			1915.01		1235.92		998.14		998.14		998.14	
Cost per sq. yd. ....			.3940		.3970		.3967		.3967		.3967	
Cost per cu. yd.			3.586		3.788		3.516		3.516		3.516	
Sand cushion and rolling with 250-ton roller:												
Foreman	\$.192 per hr.	106 hrs.	20.35	59 hrs.	11.33	60 hrs.†	12.00	60 hrs.†	12.00	60 hrs.†	12.00	60 hrs.†
Labor .....	.25 " "	3	.75									
Labor .....	.15 " "	412½	61.88	180	24.00	230½	34.58	230½	34.58	230½	34.58	230½
Labor .....	.10 " "			45	4.50							
Cart .....	.25 " "					30	7.50	30	7.50	30	7.50	30
Team .....	.15 " "					4	.60	4	.60	4	.60	4
Team .....	.10 " "					4	.40	4	.40	4	.40	4
Sand	1.50 per ton	328.1 t.	492.15	225.2 t.	337.80	207.8 t.	311.70	207.8 t.	311.70	207.8 t.	311.70	207.8 t.
Dust	1.00 per ton					22.6	22.60	22.6	22.60	22.6	22.60	22.6
Total, sand cushion			575.13		377.63		389.38		389.38		389.38	
Cost per sq. yd. ....			.1013		.1045		.1094		.1094		.1094	
Brick	23.00 per M.	238,376	5,482.65	151,662	3,488.22	149,494	3,513.11†	149,494	3,513.11†	149,494	3,513.11†	149,494
Cost per sq. yd. ....			.9660		.9660		.9870		.9870		.9870	
Laying brick:												
Foreman .....	.192 per hr.	107 hrs.	20.54	66 hrs.	12.67	62 hrs.†	12.40	62 hrs.†	12.40	62 hrs.†	12.40	62 hrs.†
Labor .....	.30 " "	36½	10.95									
Labor .....	.25 " "	34½	8.63	45	11.25	65	16.25	65	16.25	65	16.25	65
Labor .....	.20 " "	39	7.80									
Labor .....	.15 " "	1326½	198.97	572	130.80	1044½	156.68	1044½	156.68	1044½	156.68	1044½
Labor .....	.10 " "	12	1.20	15	1.50	10	1.00	10	1.00	10	1.00	10
Total, laying brick			248.08		156.22		186.33		186.33		186.33	
Cost per sq. yd. ....			.0437		.0432		.0523		.0523		.0523	
Rolling brick:												
Foreman .....	.192 " "			4	.77							
Labor .....	.15 " "			47	7.05							
Roller .....	.50 " "	54	27.00	10	5.00	33	16.50	33	16.50	33	16.50	33
Roller engineer .....	.25 " "	59	14.75	10	2.50	34	8.50	34	8.50	34	8.50	34
Total			41.75†		15.32		25.00		25.00		25.00	
Cost per sq. yd. ....			.0073†		.0042		.0070		.0070		.0070	
Grouting:												
Foreman .....	.192 " "	42	8.06	46	8.83	31	6.20	31	6.20	31	6.20	31
Labor .....	.25 " "					18½	4.63	18½	4.63	18½	4.63	18½
Labor .....	.15 " "	586	87.90	260	39.00	231	34.65	231	34.65	231	34.65	231
Labor .....	.10 " "	2	.20	8	.80	5	.50	5	.50	5	.50	5
Mixer .....	.65 " "	14	9.10									
Mixer .....	.30 " "	19	6.70	22	6.60	18½	5.55	18½	5.55	18½	5.55	18½
Mixer man .....	.25 " "	19	4.75	22	5.50							
Total labor			115.71		60.73		51.53		51.53		51.53	
Cement	1.05 per bbl.	167 bbl.	175.35	116.75 bbl.	122.64	135.5 bbl.	142.27	135.5 bbl.	142.27	135.5 bbl.	142.27	135.5 bbl.
Sand	1.50 per ton	43.3 t.	64.95	30.7 t.	46.05	34.7 t.	52.05	34.7 t.	52.05	34.7 t.	52.05	34.7 t.
Gasoline .....	.16† per gal.	4 gal.	.64	4 gals.	.64	3 gals.	.48	3 gals.	.48	3 gals.	.48	3 gals.
Total grouting			356.65		229.94		246.36		246.36		246.36	
Cost per sq. yd. ....			.0644		.0636		.0692		.0692		.0692	
Expansion joint:												
"Elastite," ¼x4" .....	.0376 per ft.	700 ft.	26.32	375 ft.	14.10	3266 ft.	122.80	3266 ft.	122.80	3266 ft.	122.80	3266 ft.
"Elastite," 1¼x4" .....	.068 " "	1850	126.10	1125	74.25							
"Elastite," ¼x4" .....	.020 " "					120	2.40	120	2.40	120	2.40	120
Freight			21.03		12.64		26.00		26.00		26.00	
Total			169.45		100.99		151.20		151.20		151.20	
Cost per sq. yd. ....			.0298		.0279		.0424		.0424		.0424	

ITEMIZED COST OF BRICK PAVING IN CARLISLE, PA. (Continued).

Items	Rate	N. Hanover St.		S. Hanover St.		W. High St.	
		Number	Cost	Number	Cost	Number	Cost
Sand covering:							
Foreman	\$0.20 per hr.	20	hrs.	12	hrs.	4	hrs.
Labor .....	.15 " "	15	tons	9	tons	29½	"
Sand	1.50 per ton	15	tons	9	tons	12.5	tons
Total, sand covering	.....	.....	25.50	.....	15.30	.....	23.98
Cost per sq. yd....	.....	.....	.0045	.....	.0042	.....	.0067
Miscellaneous:							
Foreman .....	.192 per hr.	2	hrs.	.....	.....	10	hrs.†
Labor .....	.25 " "	.....	.....	3	hrs.	11	"
Labor .....	.15 " "	70	"	55	"	100	"
Labor .....	.10 " "	.....	.....	5	"	24	"
Mason .....	.35 " "	15	"	.....	.....	.....	.....
Cart .....	.25 " "	16	"	5	"	21½	"
Team .....	.15 " "	3	"	.....	.....	.....	.....
Squeegees .....	.50 each	6	.....	3	.....	2	.....
Brooms .....	.40 " "	12	.....	8	.....	8	.....
Picks dressed.....	.10 " "	75	.....	45	.....	30	.....
Gloves .....	.....	10	doz.	2	doz.	.....	.....
Leather for laying brick .....	.....	.....	.....	.....	.....	.....	.50
Coal oil .....	.10 per gal.	59½	gals.	35	gals.	40	gals.
Oil .....	.16 per qt.	2	qts.	.....	.....	.....	.....
Small items.....	.....	.....	2.56	.....	2.00	.....	2.00
Total, miscellaneous	.....	.....	65.61	.....	30.25	.....	41.23
Cost per sq. yd....	.....	.....	.0115	.....	.0083	.....	.0115
Grand total.....	.....	.....	10,175.94	.....	6,318.20	.....	6,462.50††
Total cost per sq. yd. with concrete base	.....	.....	1.8749	.....	1.8180	.....	1.9358††
Intersection drainage	.....	.....	.....	.....	596.40	.....	.....

* 2,580.7 sq. yds. of concrete, 916.5 sq. yds. of macadam base. Including culvert, 3,588.6 sq. yds. Trolley area, 62.2 sq. yds. † At 20 cts. per hour. ‡ Macadam base. § \$0.75 and \$0.17 respectively for W. High St. ** Hauling limestone dust for stone cushion. †† \$0.13 for S. Hanover St. and \$0.17 for W. High St. †† At \$23.50 per M. §§ Or \$1.4689 with macadam base. †† Includes \$3.91 for culvert at Mansion House.

Quantities of Materials Used Per Square Yard of Brick Paving Construction, Season of 1915.

	N. Hanover Street.	S. Hanover Street.	W. High Street.	Average.
	Yds.	Yds.	Yds.	Yds.
Concrete Base. 1:3:6				
1 Barrel cement to.....	9.87	9.98	9.22	9.69
1 Ton sand to.....	15.70	14.50	14.70	14.97
1 Cubic yard stone to..	11.20	11.50	11.30	11.33
Grouting. 1:1 1/2				
1 Barrel cement to....	33.90	30.80	26.30	30.33
1 Ton sand to.....	131.00	117.60	104.00	117.53
Sand Cushion. 1 1/2				
1 Ton sand to.....	17.30	16.00	15.40	16.23

The tracks of the Cumberland Valley Railroad Company are on this street and this company, being unwilling to pave along and between their tracks, agreed to construct concrete curbing two feet outside of their rails, which was accordingly done at cost of 35 cents per foot, using proportions 1:2:3.

At the intersection of High and West streets a special corrugated culvert was designed, 10 inches high and 36 inches wide with concrete bottom tied in with the concrete base of the pavement and reinforced concrete wearing surface two inches thick.

NOTES.

We used no templates in pulling off concrete or cushion owing to the fact that on all of our central streets the cross-sections vary greatly, there being perhaps a five-inch gutter at one intersection while 500 feet farther, at the next intersection, a ten-inch gutter is necessary, and in many cases one side of the street is from ten to twelve inches higher than the opposite side.

The borough operates its own quarry and crushing plant, and nearly 3,000 cubic yards of stone have been used this season for concrete and macadam work.

All macadam excavated was used in patching and resurfacing macadam streets adjacent to the work, the excavated material being excellent for this class of work, packing readily under traffic.

Brick was purchased early in the spring at a saving of 50 cents per thousand and hauled at once to blocks to be paved, excepting in cases where owners had not laid concrete sidewalks, in which case brick was stacked at railroad yard until needed.

The hauling was done with carts at 25 cents per hour,

and two dump wagons belonging to fire companies, one company receiving 10 cents and the other 15 cents per hour for the use of their horses.

We have charged our own mixer to the job at 35 cents per hour.

A tandem roller was used only ten hours on South Hanover street, owing to breakdown which necessitated the use of a five-ton horse roller drawn by twelve men, which cost about half as much as tandem rolling, owing to lost time in making fire, intervals between rolling, etc.

Cement was contracted for in March, which accounts for very low price, and was delivered on job when needed.

In the timekeeping system, each detail of job is given a separate number, viz., grading, No. 70; concrete base, 70a; sand cushion, 71; laying brick, 72, and so on. In order that different job numbers might not be confusing to timekeeper, the same job numbers were used on all three jobs but different colored ink used—red on North Hanover street, green on South Hanover street, and brown on West High street, black ink being used for all other jobs.

Material slips were made out each day by material dealers, and notation made thereon by the inspector of the work same were used on.

We figure that we have saved at least \$4,500 on our season's brick pavement construction by adopting force account instead of the contract system.

RAINFALLS OF EXTREME AMOUNTS.

The accompanying table of rainfalls in excessive storms was compiled by Fay, Spofford & Thorndike, consulting engineers, of Boston, for use in connection with the planning of sewers and surface drains in Fall River, Mass. They are all taken from authoritative sources:

Date	Duration Days	Amt. Ins.	Authority	Remarks
Feb., 1886	2	5.62	Boston Records,	Stony Brook flood,
June, 1875	1	5.37	John R. Freeman,	6 ins. snow on
Nov., 1876	2	6.37	Charles River Dam	ground.
Aug., 1879	1	4.99	Report, p. 495	
Mar., 1913	1	4.02	Alvord, "Columbus	Rainfall near Co-
Mar., 1913	2	5.78	Flood Protection,"	lumbus, Ohio.
Mar., 1913	3	7.53	p. 51.	
Mar., 1907	2	7.19		

Feb., 1874	1	3.13	Van Hook, "Cincin-	Records kept
June, 1880	1	4.04	nati Sewerage,"	since 1871.
Feb., 1884	3	4.56	p. 96.	
Mar., 1897	1	4.97		
Oct., 1895	1	5.20	Folwell, "Water	At New York
Oct., 1882	1	6.17	Supply Eng.,"	At Boston
May, 1893	1	3.60	p. 80.	At New York
Oct., 1869	2	1.50	James B. Francis,	At New Bedford
Oct., 1869	2	4.11	Trans. Am. Soc. C.	At New York
Oct., 1869	2	7.85	E., 1878, p. 224.	At Willett's Point
Oct., 1869	2	8.71		At Chicopee
.....	2	12.00	Capt. R. L. Hoxie,	At New London
.....	1	8.90	Trans. Am. Soc. C.	At Philadelphia
.....	1½	12.35	E., 1891, p. 70.	At Canton, Conn.
Feb., 1886	2	7.87	Report of Engr.,	At Fall River
			Fall River Water	
			Works, 1886.	
July, 1915	1	4.45	U. S. Weather	At Boston
July, 1915	1	4.86	Bureau, G. A. Car-	At Pawtucket
			penter, City Engr.	

MUNICIPAL INSPECTION IN NEW YORK*

Organization of Inspecting Force—Instructions to Inspectors—Specifications Carefully Drawn and Strictly Enforced—Co-operation with Contractors.

By FELIX KLEEGER,†

Mr. Kleeberg calls our attention to the appropriateness of this paper, prepared last October, as an illustration of the carrying out of the recommendations made in our editorial of November 18th. The system herein described is calculated to secure full conformity of work with specifications.

The inspection force employed in the supervision of roadway construction in the Borough of Manhattan, New York City, consists at the present time of 138 men, responsible to and directed by the chief engineer of highways. This force is divided into:

- 50 Inspectors of regulating, grading and paving;
- 46 Inspectors of public works;
- 10 Junior chemists;
- 32 Corporation inspectors.

The men comprising the first two groups may be assigned either to street paving as such or to patrol duty. In the former case they are unofficially known as roadway inspectors and inspect either construction work or repairs. In the latter case they patrol a certain district, reporting defects in pavements needing repairs due to wear and tear, bad depressions, cave-ins, openings of various kinds, etc., and are known as patrol inspectors.

The inspectors of public works may be assigned to other duties besides roadway construction if circumstances demand and warrant.

The junior chemists are assigned to the contractors' asphalt plants and are unofficially called plant inspectors.

The corporation inspectors supervise cuts, openings and repairs made by gas, electric, street railway and other corporations.

The men comprising the first three groups are appointed, after competitive examinations of a more or less technical nature, from Civil Service lists.

The last group is appointed by the president of the borough.

That the inspectors should be and are thoroughly familiar with the contract and specifications under which the particular work to which they are assigned is carried on need not be dwelt upon, but in addition each group receives printed instructions stating in detail points not specifically mentioned but implied by the contract and specifications, and also regulations regarding

the daily reports that must be forwarded by the inspector to his immediate superior, in order that a complete record of all work performed should be available.

The keynote of these instructions is alertness, courtesy, tact, and last but not least, strict compliance with the specifications. As far as the inspector is concerned the specifications are immutable. He must enforce them not only in spirit, but to the letter. A little lee-way here and a little lee-way there, and inspection soon becomes a farce. This insistence upon strict compliance with the letter of the specifications implies that these have been drawn with the utmost care and the utmost fairness. It means that non-essentials have been eliminated, and that, where definite limits have been established, these are as liberal as is compatible with safety and good work. To draw up a specification which it is intended to enforce absolutely is a serious matter, and engineers should not thoughtlessly embody unimportant details or requirements which the contractor can live up to only with great difficulty, and which hamper him in his work. Two parties entering into a contract deserve equal consideration. Competition today is keen and prices are low. The borough of Manhattan does not begrudge the contractor a fair profit in return for work properly performed. It is the policy of the borough, though insisting that the specifications be lived up to, to see that the contractor's interests are conserved equally with those of the city. Whenever the inspector can aid the contractor in expediting his work or aid him by advice or otherwise, he does so. Good fellowship must exist in order to obtain best results.

Inspectors are instructed that they are not detectives who should stealthily discover wrongdoing, but that their duty is only to see that the specifications are enforced and not violated. A contractor today who deliberately attempts to use materials of inferior quality, or deliberately connives at inferior workmanship is an exception.

Contractors, as a rule, order their supplies from the material men with the understanding that deliveries must comply with the specifications. As an aid in this direction and to avoid delay incident to analyzing the material after it has been brought to the line of work and rejected if unsatisfactory, it has been found practicable with some classes of materials to send inspectors to the supply men's plants to obtain samples of the stock intended for shipment to Manhattan borough contractors and to analyze the same. If these are found satisfactory they are marked for identification and the material men notified that the particular lot meets specification requirements. When this procedure is not practical, it frequently happens that supply men, trusting apparently to lax inspection, ship material which manifestly does not meet specifications although ordered in perfect good faith by the contractor, with the result that delay and annoyance follows.

A recent case in point occurred where a broken stone aggregate, which required a certain grading, was delivered containing over 25 per cent of material coarser than permitted. The stone was condemned. The contractor, his work tied up, his force idle, sought an interview bringing the supply man with him. The latter, one of the largest producers, stated unequivocally that a 25 per cent excess was the best that could be obtained commercially; that if we insisted on better results it would necessitate an entire rearrangement in the screens at his plant at an enormous cost, and only after the lapse of considerable time. Moreover, he stated that he was supplying the same stone under the identical specifications to a certain corporation using thousands of cubic yards and that it was being accepted without

*Paper before convention of American Society of Municipal Improvements.

†Chemist, Department of Public Works, Borough of Manhattan, New York.

question. The writer trusts that the latter statement was an error. This matter, as are all questions of similar nature, was referred to the chief engineer, who insisted upon having the specifications complied with, and threw out the hint that the specifications permitted the use of either gravel or broken stone. This had the desired effect. A few hours later the material man stated that a stone of the desired grading would be supplied and a satisfactory shipment was received in short order. Since that time little trouble has been experienced in obtaining satisfactory stone.

The rule that inspectors must insist on the letter of the specifications being complied with has resulted in occasional complaints that attempts made by the contractor to do better work than the specifications called for have been frowned upon, and that such attempts have been frustrated and ruled out. As a general rule, where a contractor desires modification of the specifications during the progress of the work, he either is a faddist or has some ulterior motive. This is, however, not always the case. Valuable suggestions have been received from contractors which have been incorporated in the specifications at subsequent lettings. Criticism of the specifications by the contractor is always welcomed and receives proper consideration.

Inspectors frequently have difficulty in impressing upon contractors the necessity of attention to details, and yet on this is dependent the obtaining of either excellent results or indifferent results. Moreover, if the contractor will train his organization efficiently it will cost him not one cent more to do the very best work rather than poor work. The inspector can be a great aid to the contractor in training workmen efficiently by tactful suggestions—these always being made to the foreman and not to the laboring force directly.

Unfortunately the necessity and value of demanding strict attention to details is not always appreciated by contractors and their superintendents. This is the case particularly with some of the old-time road-men. A superintendent of an asphalt plant, newly appointed by a contractor, recently called on the writer and after introducing himself and stating that he had been in the business for over thirty years, remarked that he wished to do the best work but that of course an asphalt plant was not an apothecary's shop, and that formulas of mixtures and prescribed temperature limits could not be accurately followed. This old asphalt man was mistaken. An asphalt plant of today is exactly like an apothecary's shop. There is no reason why the proportion of the ingredients in one batch should not, within very narrow limits, be exactly like the proportion in the next batch, and no reason why the temperature of the sand, the stone and the asphaltic cement should not be accurately controlled. There is every reason why a uniformly good asphalt pavement must be the result under a system of inspection that demands that the quality of the material used must be exactly as specified, that the ingredients must be mixed under uniform conditions, and that the mixtures must be laid with every precaution which experience has taught is necessary. For this reason, defects in the asphalt pavements in the borough of Manhattan since this system of inspection has been in force are conspicuous by their absence. It is a fact that some of the work done years ago by rule of thumb methods and under lax inspection turned out remarkably well, but this was due more to good fortune than good management, and such methods belong to the past.

INSPECTING ASPHALT PAVING.

It would not be possible in the scope of this paper to give a detailed account of the methods followed by each group of inspectors. A brief summary of the duties

performed by the inspectors who control the output of the asphalt mixtures at the contractors' plants will indicate the methods employed in general.

The contractor having been ordered to proceed with his contract, the plant inspector visits the plant and obtains samples of all materials which it is proposed to use. The inspector himself performs the physical tests required, and forwards to the main laboratory samples of the materials requiring chemical analysis. The inspector ascertains whether the scales used in weighing out the asphaltic cement, sand, stone and filler, as also the recording thermometric instruments, are in proper working order, and determines whether they are accurate. He receives from the main laboratory the formula which the contractor has elected to use in the preparation of the surface and binder mixture, which formulas have previously been submitted to the chief engineer, and, if satisfactory, approved by the latter. He receives instructions as to the penetration of the asphaltic cement which the contractor has been directed to use on the particular contract in question. These preliminaries having been attended to, operations are begun.

The contractors' plants, naturally, are situated in outlying districts or adjoining boroughs, necessitating frequently hauls, with horse drawn trucks, of two or more hours. In consequence, in order that materials should reach the line of work at a seasonable hour, plant operations are often started as early as 4 or 5 a. m., necessitating early rising on the part of the inspector. Before each truckload of material is permitted to leave the plant the truck-driver must obtain a slip properly filled out and signed by the plant inspector, giving data as regards temperature of load, time of departure, truck number, etc. This slip must be delivered by the truck driver to the road inspector, and no material can be accepted by the latter unless the signed slip is presented to him. The maximum temperature at which mixtures can leave the plant, varying with each particular kind of asphalt used, is prescribed, and similarly the minimum temperature at which it can be accepted on the street. In this manner the plant inspector is brought in touch with the roadway inspector. The latter, after taking the temperature of the load, indicates this on the same slip handed him by the truckdriver. This slip eventually is forwarded to the main laboratory, where it is filed, together with all analytical data regarding the roadway, forming part of the complete history of the pavement. As the work proceeds the plant inspector each day tests the sand, stone, filler and asphaltic cement, and convinces himself that the material used is running uniformly, and by means of pat paper tests controls the proportion of bitumen in the wearing surface mixture.

If new shipments of materials are received, these must be tested and approved before their use is permitted. Here again the contractors' interests are conserved, every effort being made to give him a report concerning the quality of the shipment at the earliest possible moment, so that unloading and use of the material if satisfactory can proceed with the least delay. Even in the case of the time-consuming complete analysis of asphalt, though the sample reaches the main laboratory late in the day, a report is made before noon of the next day. This is accomplished through the use of automatic time-controlled ovens and automatic extraction apparatus which operates during the night. When inspectors were first placed at the contractors' plants, they were decidedly *personae non gratae* at a number of them. But now their presence is welcome, as the contractor realizes that the service of a trained technical man at the plant is not a disadvantage to him.

Formerly a guarantee period of 15 years was required

for asphalt surfaces. This has been reduced to 5 years and, in the writer's judgment, this period could be considerably shortened without detriment and with mutual advantage to both contractor and city.

There is no question that the city is amply repaid for inspection expenditures at the present time.

It may be that in time the number of inspectors employed in the borough can be reduced. The writer about two years ago, in visiting the large cities of Europe with a view to studying inspection and laboratory methods, was struck with the absence of any elaborate system of inspection. In the city of Berlin proper, for example, he was informed that the contractor himself has inspection under his own supervision and sends the materials which he uses to the government laboratory for tests. Contracts are let under a long-term guarantee, during which time the contractor must make repairs at a fixed rate, and it behooves him to do the best of work. But aside from this, the writer was informed that the contractors have so much civic pride that they tolerate only the best work, and that the contractor knows full well that he would never receive another contract unless his work was performed beyond criticism. As a matter of fact, in Berlin the contractor is inspected and not his work; that is, only firms or individuals of undoubted probity and trustworthiness are permitted to compete on work let by the city. It would be well if the American contractor would emulate his European colleague and always have his civic duty in view. Gradually this desirable condition is becoming a fact. Not only should the contractor bear this point in view, but the inspector as well, and it is impressed on the latter that successful inspection demands that the inspector should always remember that he is not simply "holding a job," but that it is his own city which is being served, that it is practically his own work which he is inspecting and that he should display the same interest that we all feel in matters which directly concern us.

To summarize, inspection methods in the Borough of Manhattan require:

1. Specifications carefully drawn, embodying only essentials.
2. Enforcement of the specifications to the letter.

3. The contractors' interests to be conserved equally with that of the city.

4. Alertness, courtesy, civic pride and interest on the part of the inspector.

BRICK ON OLD MACADAM BASE.

An illustration of the laying of a brick pavement on an old macadam pavement as the base, in place of concrete, is offered by what is known as Cedar road, extending outward from the city limits of Cleveland, O., at a point where there is considerable development of a residential section occurring. It is estimated that the traffic over this road is approximately 300 vehicles a day.

The construction was originally telford macadam and on account of heavy traffic the surface had become very rough and worn down to the telford foundation stones, making the road very difficult to travel. In conformity with the prevailing practice on roads in the vicinity of Cleveland to pave all modern highways with brick, it was decided to use that material in improving this road.

As the telford base had been down some time and was thoroughly settled in place, it was decided to use this as a foundation instead of replacing it with concrete. The surface was too rough to use as it stood, however, and had to be smoothed off. Prominent irregularities were removed by hand sledging, breaking off the higher bunches of stone, the pieces broken off being distributed over the depressions to which was added slag passing a 2-inch and retained on a 1-inch screen which was spread over the entire street. On top of this was spread granulated slag and the whole was then sprinkled and rolled to form an even surface.

On this brick was laid according to standard methods, using a 1½-inch sand cushion which was rolled, struck off to grade and re-rolled. "Medal" hillside blocks were used for the pavement. Cement filler was used up to within about 250 feet of the upper end of the road and Barrett Manufacturing Company's plastic filler for the remainder.

This road has been open to travel for several months and traffic over it has increased very greatly and has



LAYING AND ROLLING BRICK ON THE CEDAR ROAD HILL.
Note method of laying brick around curve by inserting V's at intervals.



COMPLETED PAVEMENT, CEDAR ROAD.

The appearance of wide joints is due to the use of hillside brick.

served to emphasize the necessity in this type of construction of thoroughly compacting the material forming the base. In this particular street this compacting was unusually difficult because of the extreme roughness of the old telford base, and the results obtained were not the best for this reason. Even with this unusually unfavorable condition of the macadam, however, the result is considered quite satisfactory.

PAYMENTS FOR REFUSE COLLECTIONS

Different Methods Employed in More Than Two Hundred Cities—Synopsis of Tables in a Previous Issue.

Ninety of the cities listed in the tables of the November 11 issue collect refuse by city employes and pay the collection costs from the general tax levy; while 6, although city employes collect, charge the householder directly for the service. In 70 cities refuse is collected by general contract, the contractor being paid by the city in 57 cities and by the householder in 13. No provision for collection, except licensing the collectors, and not always that, is made in 36 cities.

Trade or industrial refuse is collected, either entirely or in part, by 43 cities, but ten of these make a charge for it. Twenty-five cities, in addition to household garbage, ashes and rubbish, dead animals and trade refuse, collect other wastes, including limbs of trees, night soil, grass and weeds from lawns and gardens, old furniture and leaves.

CITIES CLASSIFIED BY PAYMENT METHODS.

The following-named cities collect refuse by city employes and pay the collection costs for household refuse from the general tax levy: Mobile, Selma, Ala. Los Angeles, Cal. Hartford, Middletown, Norwalk, Conn. Brunswick, Ga. Cairo, Chicago, Chicago Heights, Evanston, Moline, Peoria, Ill. Ft. Wayne, Gary, Huntington, Jeffersonville, Logansport (business district), Marion, New Albany, Peru, Ind. Davenport, Sioux City, Ia. Covington, Ky. Lake Charles, New Orleans, La. Lewiston, Me. Arlington, Boston, Cambridge, Everett (ashes), Lawrence, Lynn, Medford, New Bedford (ashes), Newton (ashes), Somerville, Springfield, Mass. Detroit, Grand Rapids, Manistee, Marquette, Port Huron, Mich. Minneapolis, St. Paul, Minn. St. Louis, Mo. Natchez, Miss. Butte, Mont. Nashua, Portsmouth, N. H. Bayonne, Irvington, Montclair, Passaic, Trenton, N. J. Buffalo, Hudson, Rochester (ashes and rubbish), Syracuse, N. Y. Asheville, Durham, Wilmington, N. C. Chillicothe, Cleveland, Dayton, O. Allentown,

Coatesville, Easton, North Braddock, Reading, Pa. Charleston, Columbia, Greenville, S. C. Jackson, Nashville, Tenn. Austin, Tex. Danville, Norfolk, Petersburg, Staunton, Va. Seattle, Wash. Bluefield (ashes and rubbish), W. Va. Madison (ashes and rubbish), Marinette, Milwaukee, Wis. London, Ont.; Port Arthur, Ont. (garbage); St. Catharines, Ont.; Victoria, B. C.; Windsor, Ont.

The following-named cities collect refuse by city employees and charge householders directly for same: Charlotte, Greensboro, N. C. Shawnee, Okla. Spokane, Wash. Eau Claire, Wis. Port Arthur, Ont. (except garbage in regular cans).

The following have refuse collected by general contract made by city, contractor being paid by city: Colorado Springs, Colo. (garbage only; city receives \$1,440 for privilege). Denver, Colo. (collected gratis by Hog Growers' Association). Bridgeport, Hartford, New Britain, Willimantic, Conn. Washington, D. C. Pensacola, Fla. Rockport, Streator, Ill. Elkhart, Logansport (residence district), Peru, Ind. Burlington, Ia. Auburn, Me. Frederick, Hagerstown, Md. Everett (garbage), Greenfield, New Bedford (garbage), Newton (garbage), North Adams, Woburn, Mass. Ann Arbor, Mich. Mankato, Minn. Bloomfield, Jersey City, Newark, Paterson, Phillipsburg, N. J. Albany (garbage), Gloversville, North Tonawanda, Port Chester, Rochester (garbage), Schenectady, Utica, Watertown, N. Y. Fargo, N. D. East Liverpool, Lakewood (garbage), Lorain, Middletown, Piqua, O. Farrell, McKees Rocks, Philadelphia, Pittsburgh, Pa. Pawtucket, Providence, R. I. Barre, Burlington, Vt. Walla Walla, Wash. Bluefield (garbage), W. Va. Madison (garbage), Wis. Cheyenne, Wyo. Brantford, Ontario.

The following cities agree with private contractors for rates, which are paid directly to the contractor by householders: Pine Bluffs, Ark. Oakland, Cal. (35 cents per month for ordinary family, \$1 per cubic yard). Pueblo, Colo. (householders may be charged, but seldom are). Decatur, Ill. (charges \$1 per month). Boone, Ia. (city contributes about \$50 per month, property owners pay about 25 cents per week). Flint, Kalamazoo (householder pays contractor 50 cents per month), Menominee, Mich. St. Cloud, Minn. (householders charged \$1.25 per year for garbage when collected, 75 cents per month per animal for manure). Sedalia, Mo. Olean, N. Y. (householder pays 50 cents per month). Enid, Okla. Monessen, Pa.

The following cities make no provision for collection, except licensing of collectors and not always this; each householder making his own arrangements and prices: Berkeley, Pasadena, Sacramento, Santa Barbara, Cal. Danbury, Conn. Boise City, Ida. Waukegan, Ill. Marshalltown, Muscatine, Ottumwa, Ia. Independence, Kansas City, Pittsburg, Wichita, Kans. Bangor, Me. Framingham, Mass. Battle Creek, Mich. (contractor furnishes cans at 60 cents per month). Stillwater, Minn. Jefferson City, Mo. Anaconda, Mont. (each householder makes his own contract, about \$1 per month). Lincoln, Neb. Millville, Plainfield, N. J. (pays for garbage about 50 cents per month, for ashes 10 cents a barrel). Albuquerque, N. M. Albany, Binghamton (several sanitary garbage companies remove 60 per cent of garbage, householders paying 10 cents per week), Fulton, Glens Falls, Ogdensburg, N. Y. Cambridge, Newark, O. Portland, Ore. Columbia, Warren, Pa. (50 cents per month per family). Woonsocket, R. I. Tacoma, Wash.

The following cities collect trade or industrial refuse: Hartford (some), Middletown, Conn. (some). Brunswick, Ga. Cairo, Chicago Heights, Ill. Jeffersonville (some). Logansport, New Albany, Ind. (some). New Orleans, La. Frederick, Md. Arlington, Everett, Lynn, Medford (special charge), New Bedford, Newton (special charge), Springfield, Mass. (special charge). Marquette, Mich. (some). Butte, Mont. Nashua, Portsmouth, N. H. Bayonne, Irvington, N. J. Hudson, Rochester, N. Y. (3 cents per barrel). Asheville, Charlotte (special charge), Durham, Greenboro (special charge), Wilmington, N. C. Fargo, N. D. (special charge). Chillicothe, East Liverpool, O. (some). Shawnee, Okla. (special charge). Coatesville, Philadelphia, Pa. (reasonable amount). Columbia, Greenville, S. C. Nashville, Tenn. Staunton, Va. Bluefield, W. Va. Victoria, B. C. (special charge); Windsor, Ontario.

MISCELLANEOUS COLLECTIONS.

In addition to garbage, ashes, rubbish and trade refuse, some cities collect other materials. Most cities refuse to remove grass clippings and tree trimmings, plaster and other building wastes, and furniture and other rub-

bish too large to be placed in a barrel. The following cities, however, are noted as exceptions:

These cities collect wastes other than household garbage, ashes and rubbish, dead animals and trade or industrial refuse: Pasadena, Cal., street sweepings; Hartford, Conn., leaves, grass, shrubbery; Norwalk, Conn., all but trade or industrial refuse; Washington, D. C., night soil; Pensacola, Fla., lawn mowings and tree trimmings; Boise City, street sweepings; Evanston, Ill., branches, grass, leaves; Moline, Ill., retail trade garbage; Huntingdon, Ind., tree limbs and leaves; Marion, Ind., street sweepings; Springfield, Mass., trade ashes when not produced for power; Marquette, Mich., all street refuse; St. Cloud, Minn., manure; Moberly, Mo., dogs killed by officers; Sedalia, Mo., street cleanings; Irvington, N. J., lawn clippings and weeds from gardens; Plainfield, N. J., street sweepings; Durham, N. C., night soil; Wilmington, N. C., spoiled meat and fish; Chillicothe, O., grass and small brush; Piqua, O., dogs and cats; Easton, Pa., garden rubbish; Philadelphia, Pa., old furniture, etc., branches, shrubs, vines, grass and weeds; Charleston, S. C., lawn cuttings and tree trimmings; Cheyenne, Wyo., lawn clippings, grass and weeds.

CARE OF MUNICIPAL HORSES.

Owing to the number of deaths among the horses of the Department of Street Cleaning of New York City that were evidently due to carelessness or ignorance in 1914, a board of inquiry was formed in each borough to investigate into the death of every horse for the purpose of determining the cause of death and what employee, if any, was responsible. In a number of cases it was found that some employees were lax, but the main benefit derived from the work of this board and from the distribution among the drivers, stablemen and hostlers of a pamphlet entitled "Sick Horses—How to Prevent, How to Tell and What to Do," was the bringing out of weak points in the stable management and the realization by everyone concerned of the importance of proper treatment of the horses in every detail. Of the 223 horses which died during the year, 100 deaths were from gastrointestinal troubles, 25 from pulmonary, 19 from septic poisoning, 14 from cardiac, 10 from heat, 9 from azoturia, 6 from tetanus, 2 from spinal meningitis, 4 from glanders, 1 from influenza and 1 from purpura hemorrhagica, while 32 died from accidents.

Draft horses cost \$285 per head and driving horses \$215, this being \$55 less for draft horses than had been paid the previous year. In purchasing the horses, three men who were appointed from the ranks of the stable foremen selected the animals which they considered suitable for the work and these were then submitted to an examination for soundness by the chief veterinarian of the department. They were then tried for ten days, during which time they were under constant veterinary supervision and if any faults, vices or defects were discovered, the animals were promptly rejected and returned. During the year 1,058 horses were examined, 593 were accepted by the stable foremen, and of these 119 were rejected by the veterinarian. Of the 474 accepted for trial, 93 were rejected during trial and 8 died during trial, leaving 373 finally accepted by the department. New horses were carefully broken into the work at the receiving stables and were then transferred to the different department stables, care being exercised to allot them to districts and services for which they were adapted by reason of weight and size.

In shoeing the horses, their feet are protected from nails, etc., by equipping them with leather soles. Horses with poor feet, snow plow horses and driving horses are equipped with rubber pads. Every horse is provided with at least one new shoe on each foot within each calendar month.

The daily allowance of feed is 21 pounds of oats and

15 pounds of hay, with an increase of the oats to 23 pounds during the winter months, while 25 pounds of oats and 18 of hay is allowed in certain stables located in hilly districts.

Horses are closely inspected on entering and leaving stable for loose shoes, sores, lameness, signs of sickness, etc. First aid veterinary kits are installed at all dumps. Watering tubs also are provided there, in order that the horses may be watered after dumping each load. Horses in certain districts are provided with muzzles to prevent their eating grass, leaves, garbage and other matters. Woolen blankets are provided for all horses that are fed outside of the stables at noon time.

The work of the department of street cleaning and refuse collection is heavy and steady, and continuing it every day summer and winter is the chief cause of rendering horses unfit for work in the department. It is considered desirable to have a sufficient supply of horses to allow each horse some rest during the week.

SMALL SEWAGE DISPOSAL PLANT.

The State Board of Health of Pennsylvania is gradually securing the construction of sewage disposal plants in cities and villages of all sizes where they are not already installed and especially where the necessity appears to be greatest. Ebensburg, with a population of less than 2,000, has recently put into operation a plant consisting of screens, Imhoff tanks and a sprinkling filter, the effluent from the last named being passed through settling basins.

The plant was designed on the basis of 125 gallons per capita for a population of 2,800, which is the population estimated for the year 1930. The sewage contains no manufacturing wastes or anything but residential sewage. The screens are of bars spaced with $1\frac{1}{4}$ -inch openings and slanted so as to be self-cleaning. From the screens the sewage enters two parallel Imhoff tanks, the settling chamber of each of which has a capacity of 18,750 gallons, which will give a detention of 1.7 hours with a maximum rate of 32,000 gallons per hour. This rate will not occur for about fifteen years. With the present population the maximum flow is about 5,150 gallons per hour, giving 3.65 hours' detention with one tank alone. The tank is provided with galvanized baffles which are adjustable. Each tank has a sludge compartment capacity of 1,425 cubic feet, giving in the two tanks about 1 cubic foot for each inhabitant for the assumed maximum population.

The effluent from the Imhoff tanks passes to a syphon chamber, from which it is discharged at intervals estimated to vary from 10 to 42 minutes, and is sprayed through 60 square-spraying nozzles which are placed 11 feet on centers both ways. The size of the filter gives the area necessary for a rate of 2,200,000 gallons per acre. The effective depth is 7 feet to the drain tile. The filtering material is broken limestone ranging from $1\frac{1}{4}$ to $2\frac{1}{2}$ inches. The tiles can be cleaned from the effluent end. The lateral distributors can be cleaned by rods by removing covers at the end, the pipes first being drained individually through 1-inch plugs. The effluent from the sprinkling filter passes through two settling basins, giving it one hour detention for the full filter capacity. Provision is made for sterilizing the effluent here, should the Board of Health direct. The sediment collecting in the settling basins is pumped on to sludge beds, which also receive the sludge from the Imhoff tanks. The drainage water from the sludge beds flows to the settling basins, the outfall from which carries all the final effluent of the plant to one outlet.

Municipal Journal

Published Weekly at
50 Union Square (Fourth Ave. and 17th St.), New York
By Municipal Journal and Engineer, Inc.
Telephone, 2805 Stuyvesant, New York
Western Office, Monadnock Block, Chicago

S. W. HUME, President
J. T. MORRIS, Treas. and Mgr. A. PRESCOTT FOLWELL, Secretary
A. PRESCOTT FOLWELL, Editor

Subscription Rates
United States and possessions, Mexico, Cuba.....\$3.00 per year
All other countries..... 4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at New York, N. Y., under the Act of Congress of March 3, 1879.

CHANGE OF ADDRESS

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributions suitable for this paper either in the form of special articles or of letters discussing municipal matters, are invited and paid for.

Subscribers desiring information concerning municipal matters are requested to call upon MUNICIPAL JOURNAL, which has unusual facilities for furnishing the same, and will do so gladly and without cost.

DECEMBER 30, 1915.

CONTENTS

Brick Pavement Construction by Day Labor. (Illustrated.) By John C. Hiteshew.....	973
Rainfalls of Extreme Amounts.....	977
Municipal Inspection in New York. By Felix Kleeberg..	978
Brick on Old Macadam Base. (Illustrated.).....	980
Payments for Refuse Collections.....	981
Care of Municipal Horses.....	982
Small Sewage Disposal Plant.....	982
Municipal Work for 1916.....	983
How Much a Municipality Should Borrow.....	983
Annual Reports.....	983
Foundations for Pavements.....	984
The Week's News. (Illustrated.).....	985
Legal News—Notes of Recent Decisions.....	991
News of the Societies.....	992
Literature.....	993
Personals.....	993
New Appliances. (Illustrated.).....	994
Industrial News.....	995
Contract News.....	997

Municipal Work for 1916.

The greater part of the municipal bonds sold by any city are used for constructing municipal public works of one kind or another. In fact, practically all of them should be so used, since redeeming one series by issuing another is bad financing, and an evasion of legal restrictions in some states; and using money raised on bonds for paying current expenses is the rottenest kind of finance.

This being the case, large municipal bond issues might be taken as an indication of considerable work in prospect by the cities of the country. During November of this year the sales of long-term municipal bonds, as reported by the Daily Bond Buyer, totaled \$22,608,415, which was 75 per cent more than during November 1914. The total for the eleven months of 1915 was higher than in the corresponding months of any previous year.

That this is a favorable time to construct public works, or at least to pay for them, is indicated by recent sales of municipal bonds. During the past month sales have been made by Erie, Pa., on a 3.96 per cent basis; Westchester County, N. Y., 3.97 per cent basis; Chicago, Ill., 4 per cent basis; Wilkesbarre, Pa., 4.04 per cent; Pittsburgh, Pa. and Waterbury, Conn., 4.05 per cent, and several other sales ranging from \$100,000 to \$1,000,000 each

at rates equivalent to par on 4 per cent to 4½ per cent bonds. And all of these are bid for eagerly in spite of the fact that since January 1st more than \$3,410,000,000 of long-term municipal bonds have been sold.

Ability to float a loan is, of course, no excuse for spending money without considering the ability of the city to redeem the bonds when due; but the indications are that at least no city work need be held up through inability to raise the money to pay for it on favorable terms.

How Much a Municipality Should Borrow.

The New Jersey Legislature a few months ago appointed a commission for the Survey of Municipal Financing, and the financial conditions and methods of the municipalities of that state have been undergoing close inspection. The commission has formed certain views concerning financial methods for cities, and in explaining these recently, Arthur N. Pierson, the chairman, dwelt upon the importance of the debt limit. "The proposition," said he, "resolves itself into a question as to the ability of the municipality to carry the fixed charges imposed by its debt obligations, without handicapping its proper development or its current service. * * * It is my contention that 30 per cent of the current receipts applicable to local uses is the maximum that any municipality can carry as a fixed annual charge for debt purposes."

Cities are beginning to boost assessment values in order to raise their debt limits, and states are increasing the percentage that such limits may be of total assessed value, until taxes levied to carry bonds are becoming excessive in several cities. It is probable that bonds totaling seven per cent of the assessed value (assessment at say 90 per cent full value) is enough for any city to carry. With an average of say 8½ per cent interest and sinking fund this gives \$6 per thousand raised by annual taxes for this purpose, which would be 30 per cent of a tax rate of \$2 per hundred, which is a fairly high rate. A limit of 5 or 6 per cent of assessed value would be not unduly conservative, and exceeding this is dangerous.

The existence of easy money in the municipal bond market is not an unmixed blessing; but there is the real danger that cities will be tempted by it to borrow more than they should. Like individuals, cities should keep a reserve against unforeseen imperative needs; which reserve should not be in cash, for obvious reasons, but should be in ability to borrow on favorable terms. Such reserve inside the debt limit should be preserved against any but the most pressing needs; and a city which exceeds 5 per cent as a limit should, it would seem, be regarded as a spendthrift which may at some future time find itself in serious difficulties, not the least of which will be the driving away of business and residents by the high taxes necessary to carry its bonds.

Annual Reports.

When this issue reaches our readers the work for the year 1915 will have been practically completed, except for compiling the records and writing the reports in those cities whose fiscal year terminates with the calendar year. Many officials, we know, dread this part of their duty, and postpone as long as possible doing any work on the report. Much of this dread is due to neglect throughout the year to prepare for it. The man who has kept methodical records of all his work after a system calculated to give the facts wanted, is now in a position to obtain such facts by a few simple additions. The careless, non-methodical official will search through his note books and files, backward and forward, and after infinite labor

may fail to obtain complete and accurate data on all points desired.

If the latter is wise, he will make a New Year's resolution that on January first he will begin to install in his office a system of collecting and filing data which will enable him to prepare next year, with a small fraction of the bother he is now put to, a report which will be complete and reliable.

FOUNDATIONS FOR PAVEMENTS

Good Foundations for Desirable Gravel Roads—Preparing Sub-Grade and Base for City Pavements—Repaving Over Trenches.

In a paper entitled "Road Drainage Foundations" presented before the Pan-American Road Congress, George W. Cooley, state engineer of Minnesota, calls attention to the necessity for more careful work in preparing foundations for gravel roads. A great deal of money, he believes, is wasted in not properly preparing the foundation for such roads. The common practice has been to place 6 to 8 inches of gravel on clay or heavy soil, frequently on a newly shaped road bed; but unless compacted, this gravel serves as a sponge, holding the water until the subgrade is softened and thereby allowing the material to be cut through and much gravel to work down into the clay, and resulting in a rutted and uneven surface.

"Foundations for graveling should be firm and hard, and on new work this may be accomplished by forming a crust with a mixture of 2 or 3 inches of sand or gravel with clay subsoil, rolled to a smooth surface. On sand subsoil it is equally necessary to have a foundation to prevent loss of gravel and in such cases clay mixture is required.

"To prevent loss of surfacing gravel on a sand subgrade where no clay is available, a blanket of vegetable material has been used with complete success. In some cases this has been provided by spreading about 4 inches of loose straw for the full width of the proposed surfacing, but care must be exercised to prevent the straw from mixing with the gravel. Muskeg or pulverized peat has also been used to advantage under like conditions."

In a paper before the same congress, Frank K. Duncan, assistant engineer of the Baltimore, Md., Paving Commission, gave some excellent advice concerning foundations for city pavements, the majority of which are given below:

"When railway tracks are in a street surface, water is bound to find its way along the rails to the subgrade, and if stone or gravel is used as ballast this will act as a drain, carrying the water to the sumps in grade, which points should be properly connected up to the storm-water drains, and of course whenever underground streams or springs are encountered they must be treated in the same manner.

"In the preparation of the sub-foundation or the soil, all soft and spongy material below the subgrade should be removed and replaced by good earth, carefully rammed and care should be exercised during the grading so that the sub-foundation will not be disturbed below the subgrade. It should be hard and compact, and to insure this should be well rolled with a steam roller. This is often thought unnecessary, but if this is done the roller will find the soft spots and old and recent excavations for underground structures which have been improperly backfilled. These trenches are often the cause of failures in well constructed pavements.

"Trenches made before the paving, and cuts made after the paving has been completed, when refilled

should be hand rammed, two men to every shoveler, or puddled with water when the soil is pervious, which will allow the trench to drain and become dry and compact. When the concrete base has been cut and is being restored, the old base should be cut back from the trench on either side, so that the new base over the trench will have a bearing on the original soil, and if the ditch is a wide one, steel reinforcement costs little and adds greatly to its strength. This extra care and expense will more than be justified by the permanency of the repair.

"The real foundation for the paving is the base, and while there are various kinds, most of them have proved failures. The only one which seems worthy of considering is the ideal one, concrete, which, when well laid, is a permanent asset. The economical thickness of this base to support the pavement is a question on which the engineer must exercise his best judgment and experience. The points to be considered in fixing the depth of the base are the nature of the subsoil, the kind of traffic, the paving material to be used and the width of the street to be paved.

"Bituminous paving, other conditions being equal, requires a greater depth of base than either brick or stone paving, on account of the latter materials, when paved monolithic, having considerable strength and distributing the load over a greater area than the soft and pliable bituminous pavement, which has no inherent strength and transfers the pressure directly to the base. Slow moving traffic requires less depth of base than fast, as the impact of traffic is not so great from the slow moving team. Narrow streets, paved with a crown and with curbs on either side, owing to the arching effect of paving, will sustain a greater load than a wide street, hence less thickness of base can be used for narrow streets and alleys.

"The paving in and adjacent to railroad tracks is the most difficult to keep in repair in the city street, and the foundation becomes one of the utmost importance, for no matter how carefully the paving is laid, if the rails move, due to the passing of cars, the paving will soon go to pieces. Gravel or crushed stone, placed under the ties for a depth of about 6 inches, well tamped, makes a good foundation, but the ideal condition will be realized if crushed stone, of such a size as will be held on a 1½-inch screen and will pass a 3-inch screen, is well tamped under the ties, bringing the track to the proper alignment and grade and then the interstices in the stone filled with a cement grout in the proportions of about one to three. A concrete base will then be obtained which will make the track very rigid. This method has been used in Baltimore during the past year in the laying of about 10 miles of tracks, and the result obtained has been so satisfactory that this manner of construction is well worthy to be considered as a standard foundation for all paving laid between railway tracks. Its great advantage is that the best kind of a foundation is obtained without interfering with the operation of cars.

"The conclusions arrived at, from the observation of the laying and the maintenance of over 100 miles of various kinds of paving laid since 1902, are that unless some unusual conditions exist at the time of the laying of the concrete base, it need never be over 6 inches thick, and most streets only require a 5-inch base, and alleys and small streets need only a 4-inch base. When the concrete is well laid in proportion of about 1 part cement, 3 parts sand and 6 parts stone or gravel, experience has taught that no paving base has failed due to lack of its depth, except over improperly filled trenches and improperly constructed sub-structures."

The WEEK'S NEWS

Pennsylvania's Highway Department Reorganized—State Aid in Michigan—Indianapolis "Water Sickness"—Lake Dumping in Chicago—New Lighting in Schenectady and Camden—The Philadelphia "Battle of Experts"—Hard Fires in Boston, St. Paul and Cheyenne—New Auto Fire Apparatus—New City Managers—Snow Removal Costs—San Francisco Wins and Loses in Car Case—Jitneys Lose in Kansas—Regulating the Bay State Railways.

ROADS AND PAVEMENTS

Reorganization of Pennsylvania Highway Department.

Harrisburg, Pa.—Only the Philadelphia, Pittsburgh, York and Scranton districts escaped the general reorganization of the engineering work of the state highway department, announced by Highway Commissioner Robert J. Cunningham. One new district is created, two new assistant engineers put in charge of districts, and one transferred, while four new road superintendents are appointed and others named to take places of men who have been dismissed or asked to resign. The changes take place on January 1 next and are the result of careful study by Chief Engineer W. D. Uhler. The department in announcing the detail of the changes sets forth that "all of the new positions have been filled by promotion based on the merit system. Every man advanced has been with the state highway department for several years and has demonstrated his ability to hold his position."

Convict Labor Experiment.

Hartford, Conn.—In the report of the state highway department for the year ending Sept. 30, 1915, details of the construction of three miles of concrete road in Cheshire by the employment of inmates of the state reformatory in Cheshire are given, this being the first experiment of the department in the employment of convict labor on the state highways. The department furnished the material and equipment and paid the workers 50 cents per day, the money to be held by the reformatory for their personal use when circumstances warrant. The cost of the contract was \$31,000 and as a result of the success of the experiment reformatory labor is now being employed on the Cheshire-Waterbury road and on a highway in Colebrook. For the year the department expended on construction of state roads \$620,091.91 and for construction of trunk line roads \$361,098.52; for repair and maintenance of state roads, \$165,741.54; for reconstruction of trunk lines, \$200,000; for repair and maintenance of trunk lines, \$778,562. The law placing the care of bridges on trunk line roads in the care of the department has added to the work of the department. Under another law, the department is now investigating the condition of all trunk line bridges with a span of more than 25 feet.

New Maine State Highway.

Augusta, Me.—The new state highway, between Portland and Dunstan, which was recently officially opened

by Governor Curtis and the highway commission, is a fine concrete highway, 8¾ miles long. It is 16 feet wide—21 with the shoulders. It was built by the Hassam Paving Company, Worcester, Mass., work having begun June 16. The work was carried on under discouraging difficulties, owing to continuous rain, slowness of material supplies and finally scarcity of labor. The opening was delayed until the finishing of the new concrete bridge over the Nonesuch river at Scarborough. The highway commission is now making preparations to close up the last link in the state highway between Portland and Portsmouth, N. H. This is a distance of something over four miles between the end of the new concrete at Dunstan and the city of Saco. When this last link is finished there will be a perfect highway from the New Hampshire line at Portsmouth to Portland, which in turn will connect with the new 25-mile bituminous macadam federal aid highway between Portland and Brunswick. By the end of next season it is expected that there will be an improved highway for the entire distance between Portland and Bangor, with the exception of only about 12 miles, which are not very bad.

Road Bond Issue Valid.

Columbia, S. C.—Constitutionality of the \$1,250,000 road bond issue for Richland county and the \$950,000 road bond issue for Greenville county has been upheld by the en banc session of the supreme and circuit court judges of the state. The bond issues were put through the last session of the general assembly and suits to have them declared unconstitutional were brought before the circuit courts, and, those courts upholding them, they were taken on appeal to the supreme court. The circuit judges were called to the assistance of the supreme court to decide the questions. The same principles applied in both the Greenville and Richland bond issues. The majority opinion upholding the constitutionality of the acts settles what is bonded indebtedness under the meaning of the constitution. The opinion holds that the constitution means by bonded debt such debt as is placed on municipalities by vote of the people and not notes outstanding against the city. The opinion also holds that the constitutional bonded indebtedness in Columbia and Greenville have not been exceeded. It is also held that there is no restriction on the power of the legislature to authorize issuance of bonds by the county, and that the board of county commissioners are merely agents of the legislature for carrying on county government and the legislature can create a different set of officers than county board if it so desires. That the wheel tax, so-called, which is a gradu-



Courtesy, Portland (Me.) Evening Express and Advertiser.

SCENES ON NEW MAINE HIGHWAY.

ated tax according to horsepower, is a license and not a tax and confers the right to use an improved highway, is held by the court. The taxes for meeting the interest on the road bonds in the two counties is to be raised by a tax on motor-driven vehicles, 50 cents for each horsepower, and a tax on all vehicles, and this had been attacked by the opponents of the bonds as unconstitutional. The court upholds the principles laid down in *Carrison vs. Kershay*, which case held that a county could issue bonds without submitting the question to the qualified voters when authorized to do so by the legislature. This was one of the main attacks made on these road bond issues by the opponents. Work has already begun on the Greenville county roads, and it is supposed that the Richland bonds will be sold and work begun here without delay.

No Money for State Reward Roads.

Lansing, Mich.—Since the first of July the state highway department has approved the construction of 571 miles of state reward road in Michigan, but owing to the fact that the state treasury is short of funds the department has been unable to reimburse the counties for 188 miles of road. When there is money in the state treasury after the first of the year it will be necessary to pay out \$200,101 to the counties where highway construction has been approved. During the past five months 291 miles of single state reward road have been built and the highway department has authorized the payment of \$265,467. In the same length of time 92 miles of state trunk line road have been built and for this work the state has paid \$102,433. According to the records of the highway department the counties of the state have built 153 miles of single reward road for which no funds were available and there is \$143,110 due on this work. Thirty-five miles of trunk line road have been accepted, but no money was available and there is due for this work the sum of \$56,991. When the supreme court declared the automobile tax law passed at the session of 1913 to be unconstitutional the highway department was financially embarrassed as it was expected that much of the state reward would be paid from the money received from the tax. The last legislature passed a deficiency appropriation of \$500,000 to pay these accounts. If the new automobile tax law stands the test of the courts the state will have approximately \$750,000 for the construction of roads.

Year's Paving in Wilkes-Barre.

Wilkes-Barre, Pa.—Street paving work costing nearly \$250,000 was done in this city during the past year under the direction of Superintendent Charles N. Loveland, whose term as head of the department of streets and public improvements is now expiring. The exact amount of money spent for the work was \$243,301.48. Of this amount \$200,000 went for new paving, while the remainder of the sum was spent for repairs to pavement already laid. The year's work established a record for local street paving. Over six miles of pavement was laid, making the total mileage of paved thoroughfares 45.195 miles. The larger portion of this work was done by the Tate Paving Company.

SEWERAGE AND SANITATION

Typhoid Follows "Water Sickness."

Indianapolis, Ind.—Reports of an epidemic of typhoid fever among persons living in the northeast section of Indianapolis has resulted in a statement from Dr. J. N. Hurty, state health commissioner, to the effect that he had expected such reports, following the epidemic of "winter cholera" that held a part of the city in its grip about four weeks ago. In explanation he said that "typhoid outbreaks always follow winter cholera." Dr. Hurty, however, said that he had expected even more cases to appear than have been reported so far. Assuming that there were 2,000 cases of gastro-intestinal trouble a few weeks ago, he said he had expected reports of some 25 to 30 cases of typhoid at about this time. Such a ratio was about that which obtained following the "winter cholera" outbreak at Michigan City four years ago. The Michigan City "winter chol-

era" outbreak was traced, according to officials of the state board of health, to sewage or similar pollution in the water supply of the city which was taken from Lake Michigan. Water for Michigan City had been taken from an intake several miles out in the lake, but because that filled up with needle ice the supply was taken for a time from a point closer in shore, where sewage pollution was possible. Indianapolis has at present 15 cases, practically all in the district on the north side, where there was an epidemic of gastro-intestinal trouble last month. Physicians and experts have failed to announce the cause of the epidemic of gastro-intestinal trouble. At Galesburg, Ill., where an epidemic of winter cholera was experienced last winter, the gastro-intestinal attacks were followed in many instances by typhoid.

Typhoid in Gloucester.

Gloucester City, N. J.—Reports submitted at the meeting of the board of health showed that 19 cases of typhoid fever were reported to the board during the past 4 weeks.

New Disposal Plant in Operation.

Virginia, Minn.—The new \$80,000 sewage disposal plant erected for the city by the Lawrence-McCann Company of Eveleth has been finished, accepted by the city, and placed in operation. The new plant means that the waters of Three-Mile lake, which has been receiving the sewage from the city, will not be polluted hereafter. One pump is to be used at the plant and it will be operated by two attendants. The superstructure of the building is of brick, while the floors are of concrete. An Imhoff tank system is used.

Health Peril in Refuse Dumped in Lake.

Chicago, Ill.—Dr. John Dill Robertson, commissioner of health, has submitted a recommendation to Alderman Willis O. Nance, chairman of the council committee on health, that dumping of dredged material from the Chicago river and other places into the lake be prohibited or else a large increase in the typhoid death rate of the city is to be expected. He pointed out that typhoid cases in the Chicago avenue and Twenty-second street pumping station districts have been more frequent than in any other parts of the city. Examination disclosed that the screens of these two pumping stations were cluttered with refuse from the scows which are continually being towed out into the lake. During storms and even during calm weather, he says, a considerable portion of the contents of these scows is washed overboard before the thirteen-mile limit provided by the ordinance is reached. He asks council to determine the practicability from an engineering standpoint of requiring all dredgings to be dumped behind bulkheads. If it is found that this is possible council is asked to request congress that a law be enacted prohibiting dumping in the lake off the shore of any city deriving its water supply from such lake, except behind retaining walls and bulkheads. The health commissioner submitted with this recommendation a careful analysis of the cases of typhoid which might be attributed to water pollution in the last year.

Estimated Cost Not a Legal Limit.

Salt Lake City, Utah.—Under a ruling of the supreme court the contract price of a public improvement does not necessarily have to fall within the limit of the estimated cost of the city engineer to make the tax against the abutting property owner valid. This ruling is handed down in the case of *L. Frank Branting* against Salt Lake, an action to prevent the city collecting the difference between the estimated cost of a sewer and the actual cost, or the difference between \$1.30 a front foot and \$2.15 a front foot. In the district court the plaintiff won, but the supreme court reverses the decision, remands the case and directs that the trial court set aside its conclusions of law and dismiss the complaint of plaintiff. The sewer in question was laid about nine years ago. The engineer estimated the cost at \$1.30 a front foot, but when the bids were received the lowest bid was at a rate of \$2.15 a front foot. Notice was given of this and opportunity offered the property owners to make a protest. None was made,

the court finds. Branting paid his assessment on a basis of \$1.30 a front foot and refused to pay the balance. The lower court held that the city had no right to let a contract at a price in excess of the engineer's estimate of cost. The supreme court holds that there is nothing in the Utah statutes which prohibits the city from awarding a contract at a price higher than the estimated cost, so long as the property owners affected are duly apprised of the actual cost and given opportunity to protest. On a number of occasions the city has rejected all bids on proposed improvements because they exceeded the estimate of cost of the engineer and in several instances improvements have had to be abandoned because bids could not be secured that were within the estimate.

WATER SUPPLY

Birmingham Loses Water License Tax Case.

Birmingham, Ala.—The supreme court at Montgomery has denied the application of the city of Birmingham for a writ of certiorari requiring the court of appeals to change its decision declaring constitutional section 36-F of the revenue code of 1911. The court of appeals decided the case against the city several months ago. Contest was entered by the city as the result of the failure of D. J. O'Connell, superintendent of the Birmingham Waterworks Company, to pay an annual license of \$18,000 levied by the city. He lost in the recorder's court, but won in the circuit court. The court of appeals sustained the decision of the circuit court, whereupon application was made to the supreme court for a writ of certiorari, requiring the court of appeals to change its decision.

Charge Company Pumped Raw Water.

Pittsburgh, Pa.—That the Ohio Valley Water Co., between 1900 and 1909, drew raw water direct from the river and served it to its consumers was a statement of David B. Golden at the hearing by the public service commission of the complaint of Bellevue, Avalon, West View and McKees Rocks boroughs and Stowe township against the rates of the company. Mr. Golden, who was superintendent of the water company from 1897 to July, 1909, said the company installed 6 and 12-inch lines connected with the river. The witness said these pipes were secreted under the floor of the pumping-house on Neville Island, and when the water in the company's wells ran low the pipes were pushed out into the river and raw river water was drawn. Mr. Golden declared that the company was forced to use river water at times because it had made contracts with large manufacturing concerns, and its supply of water in the wells on Neville Island had become low. The company received 12½ to 15 cents per 1,000 cubic feet for the water, the witness averred. The witness said the water was drawn from the river at the order of Charles P. Trimble, then president of the water company. D. M. Sloan, secretary and treasurer of the company, testified that his company purchased the stock of the Monongahela

Water Co. on May 5, 1913, and said that 3,850 shares of the Ohio Valley Water Co.'s stock, the par value of which is \$50 a share, and \$100,000 in notes was paid for the Monongahela stock. He declared that the stock and notes were paid to H. P. Haas, present president of the Ohio Valley Water Co., who was not connected with the Ohio Valley company at that time, but who became its president three days after the purchase. Public Service Commissioner John S. Rilling ruled that the company should furnish information regarding its directorate for a number of years back to the complainants who were endeavoring to prove that the company had a sub rosa rate agreement with other water companies, which it purchased in 1904.

Charleston Will Not Buy Waterworks.

Charleston, S. C.—The city will not purchase the property of the Charleston Light & Water Co. for the sum of \$1,500,000, it was decided at the polls, the vote in favor of the purchase being 801 and that against it 915. The poll totalled 1,729 out of a registration of 2,635.

Now Using Filtered Water in Steubenville.

Steubenville, O.—The citizens of Steubenville are now using filtered water direct from their new \$300,000 filtration plant. The Norwood Engineering Company has had the plant under construction for the past two years. A thirty-day test of the plant is to be made by the Norwood company before it is turned over to the city. Tests of settling basins, filter beds, storage basins and other apparatus have been made during the past month which have proved satisfactory.

Must Pay More for Higher Pressure.

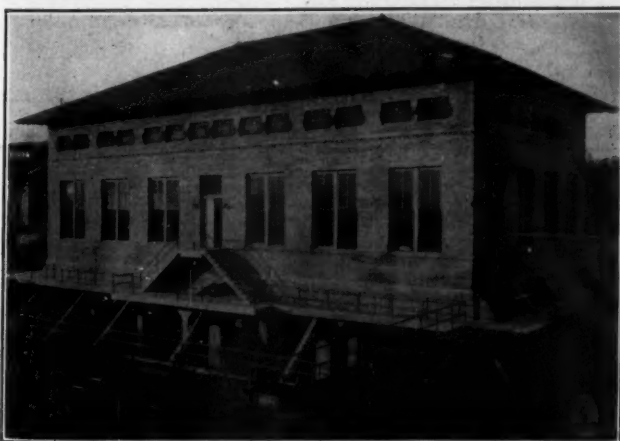
Morristown, N. J.—Stating that while it is willing to order the Morris Aqueduct Company to furnish additional water pressure for fire protection in Morris Plains, that it does not feel it should do so in view of the statement of one of the witnesses at the hearing held in the case, to the effect that the people of that place would not be willing to pay a higher charge for service in case of an increase in pressure, the Board of Public Utility Commissioners dismissed the case. The board added, however, that it will again take up the matter for consideration at any time that the customers of the Aqueduct Company in Morris Plains are willing to accept an increase in water charges, based upon any fair plan for furnishing the additional service desired by that locality. It was charged that there was insufficient domestic pressure and no protection from fire. Morris Plains is a settlement some two miles north of Morristown, with a population of about 1,200. The consumers of water served by the Aqueduct Company number about 200. While admitting that the company is legally required to give adequate fire protection, the commissioners held that, since Morristown has sufficient pressure, the burden of the cost of necessary improvements should fall on Morris Plains.

Progress on New Pumping Station.

New Orleans, La.—Superintendent Earl, Engineer Theard and other officials of the sewerage and water board were present at the launching of a large barge to be used for carrying a big dredge. The barge was at Station 5, which has been in the course of construction for some 18 months. While viewing the barge, the party made an inspection of the station, which is to be opened soon. In the station will be installed two of the 12-foot diameter Wood pumps that have been contracted for to be placed in several of the stations. The illustration shows the new pumping station.

Filtration Plant Needed to Stop Typhoid.

Monroe, Mich.—The state board of health is expected to order the erection of a filtration plant in Monroe to ward off a recurrence of the epidemic of typhoid with which the city has been affected for several years. James W. Follin, one of the state sanitary engineers, has just made a report of a survey of Monroe's water supply during the period from July 1 to November 1. He says the



Courtesy, New Orleans (La.) Times-Picayune.
NEW PUMPING STATION.

only thing which will prevent constant typhoid is a filtration plant, and recommends that the state board of health issue an order compelling the erection of one. Monroe officials, officers of the water company and local health authorities are to confer with the state board of health on the situation. In his report, Engineer Follin takes up all the sources of water supply in Monroe. Deep wells, shallow wells, and the water taken from the western end of Lake Erie were all condemned. Improvement of the entire sewerage system is recommended; a better manner of disposing of garbage suggested, and also prohibiting of ice cutting in the River Raisin below sewage outfalls. Last year there were two serious epidemics of typhoid fever in Monroe, one in December, 1914, and the other in June and July of this year. Both of them are traceable directly to contaminated wells. Mr. Follin cited that the weather reports at Monroe lighthouse showed that during December, 1914, the wind was constantly in such quarters as would bring in the sewage of the Detroit River to the point where the city water supply is obtained. In June of this year the wind drove the Monroe sewage to that point.

STREET LIGHTING AND POWER

Try Out New Lighting System.

Schenectady, N. Y.—The new lighting system in the boulevard section has been tried out before a group of city officials, members of the Boulevard Association and officials of the illuminating company. The test showed the system to be successful. The light was uniform along the entire street and pleasing to the eye. There was an absence of the spots of shadow and glare. The system is fed by underground cables and there will be 75 lamps when all are installed. The lamps are of 80 candlepower and are mounted in a 16-inch opal glass globe on the top a 10-foot concrete post.

Begin Work on White Way.

Camden, N. J.—Eight new 2,000-candlepower arc lights mark the beginning of Camden's "white way." The new lights were installed by the Public Service Electric Co. as a demonstration of its standard lamp bracket equipment now used in Newark and Harrison, at the request of the city plan commission, working in co-operation with Councilman Richard Carney, chairman of the lighting committee of the city council. The new style alabaster glass globes will be used. Plans have been prepared to increase the present lighting service by about 60 2,000-candlepower lights, giving all business streets of Camden good illumination. While the lights were installed at the request of the city plan commission and the lighting committee of the city council, the entire expense for a 30-day demonstration is being borne by the Public Service Electric Co. Whether the lights are to remain or not after the 30-day period depends entirely upon the attitude of the citizens.

More Expert Appraisals for Philadelphia.

Philadelphia, Pa.—Experts in public utility rate-making believe that, as a result of the protracted hearing in the case of the Philadelphia Electric Co. the public service commission will shortly lay down an exact program of procedure for adjusting rates. The petition for a reduction of the rates of the Philadelphia Electric Co. for both private and public lighting was filed with the public service commission 15 months ago. Since that time the proceedings have dragged for one reason or another and it is apparent that it will be many weeks more before the testimony is all in.

The latest development is the company's plan approved by the commission by which each side and the commission will appoint engineers to work together on the appraisal. It is expected that this will be completed by Feb. 1. The company, through its experts, claimed that the way to determine the valuation of the plant is to estimate what it would cost to reproduce it new. Their experts have given to the commission figures of valuation based upon their "judgment and experience," instead of

actual cost prices, which they have repeatedly declared were not obtainable. Prof. Dougal C. Jackson, a Boston expert, placed the valuation, according to this system, at \$51,000,000. William McClellan, New York electrical engineer, following the same method, arrived at a valuation of something more than \$50,000,000. The city has contended for an appraisal based upon the "historical value." William C. L. Eglin, second vice-president and chief engineer of the electric company, at one of the hearings explained the functions of the various branch properties of the company. Commissioner Monaghan inquired why the company included about \$1,000,000 of idle property, not used for generating or distributing current, in the formal appraisal from which its rate must be computed. Mr. Eglin's response was that these properties were being held in reserve for future developments.

Meantime the hearing is to continue on the present basis. The commission, however, has let it be known that the new appraisal will be taken by it only as part of the element that enters into the case and not necessarily as final. Despite its case before the public service commission, the Philadelphia Electric Co. has declined to lower the price it originally asked for furnishing electric lighting to the city for 1916. About a month ago the company made the only bid offered for the city's electric lighting for 1916, and asked as much as it received last year. Director Dripps of the department of public works rejected the bid and readvertised, with the result that the company put in virtually the same bid. The contract will be awarded to the company subject to any change in rates which may be ordered by the commission.

Merger of Indiana Utilities.

Indianapolis, Ind.—Petition for the right to buy the General Service Co. and the Indiana Lighting Co. has been filed with the public service commission by the Northern Indiana Gas & Electric Co. The purchase price is named at \$5,400,000. Permission is also asked to issue 6 per cent gold bonds for the entire purchase price. The General Service Co. and the Indiana Lighting Co. are both Murdock-controlled concerns. The former operates at Lafayette, Crawfordsville and other minor places and furnishes gas, water and electricity. The latter operates in Lafayette, Peru, Wabash, Logansport, Fort Wayne, Lima (Ohio) and other places. The Northern Indiana Gas & Electric Co. is said to be a subsidiary of the United Gas & Improvement Co. of Philadelphia. The capital stock of the Northern Indiana Gas & Electric Co. is placed at \$5,000,000 with a total bonded indebtedness of \$8,929,500. C. H. Geist, president of the Indianapolis Water Co., promoted the sale. The Indiana Lighting Co. was incorporated under the laws of Indiana on Aug. 6, 1908, with authorized capital of \$4,500,000, all of the stock having been issued. With the exception of Murdock's holdings, the stock is practically all held by New York capitalists. The company in 1914 had gross earnings of \$1,313,242, the net earnings for that year being given as \$397,362, and after all charges were paid, including a dividend of \$90,000, there was a surplus of \$48,178. The company has a funded debt of \$2,993,000, which is carried in the form of a mortgage that is not due until 1958, and which is provided for by a sinking fund.

FIRE AND POLICE

Two Firemen Lose Lives.

Boston, Mass.—Two firemen lost their lives, a third was injured so seriously that his condition is critical, two others were hurt and property loss estimated at \$25,000 resulted from a fire in a 6-story brick manufacturing building. Three alarms were given. The dead are: Charles C. Willett and Dennis A. Walsh, both hosemen of Engine 10. The injured are: William J. McCarthy, hoseman of Engine 10; William J. Connell, chauffeur of Ladder 8; Cornelius J. O'Brien, captain of Engine 10. Apparently the fire started on the fourth or fifth floor. On both these floors there was much inflammable material. Acting District Chief Hines ordered a second alarm and the third was sent in by Chief McDonough. Engine 10 company was at work

on the fourth floor, the company comprising 10 men, Captain O'Brien in charge. With a crash the roof and the two floors fell and four of the men were caught by a mass of blackened timbers and wrecked machines. Willett, Walsh and McCarthy were swept away as the mass bore down the floor on which they were standing, and were buried by tons of debris on the floor below. Capt. O'Brien, struck by a timber, clung to the edge, as the floor gave way beneath him, and crawled back to a safe place. It was nearly an hour later when moans were heard from the ruins. Soon the body of Willett was recovered. Then McCarthy, badly crushed but able to speak, was dug out. After nearly two hours the body of Walsh was found. Apparently Walsh and Willett had been killed instantly. Capt. O'Brien was struck in the back and injured painfully but stuck to his work. The injury to Connell was caused by his slipping from an aerial ladder at a height of 20 feet, falling and striking his head against the body of the truck. The cause of the fire is unknown.

New Alarm System Constructed.

Temple, Tex.—This city will be in possession of a modern fire alarm system within the next month, according to representatives of the Gamewell Company, who have begun installing the system which is to cost \$10,000. Bonds to pay for it were voted at an election held several months ago. Twenty-five signal boxes will be installed in the business section.

Firemen Get Rest in Attleboro.

Attleboro, Mass.—The firemen won their one day off in five at the recent election, carrying their proposition by a total majority of 154 votes. Three more permanent men will now be necessary to give the city the same fire protection as heretofore, and the engineers claim that the efficiency of the men will be greatly increased.

A Stubborn Fire in St. Paul.

St. Paul, Minn.—For more than three hours almost the entire strength of the fire department was pitted against a fire which destroyed a four-story paper plant, damaged two adjoining buildings and for a time threatened to spread over the street. Although the origin of the fire in the center of the building delayed the effects of the water streams, the firemen were fortunate in not having to contend with much wind. Chief Devlin and District Chief McNally were in charge of the work. The accompanying illustration shows the men on a fire-escape and a few of the fifteen lines of hose used. The damage was estimated at about \$210,000.

Mayor and Chief Hurt in Fire.

Cheyenne, Wyo.—In a fire that destroyed the Capitol Avenue Theatre, Mayor R. N. La Fountaine and Walter Bradley were slightly injured and 40 guests thinly clad were driven into the streets when the blaze threatened a hotel adjoining. The damage is estimated at \$40,000. The cause has not been determined. Edward Taylor, chief of the fire department, was overcome by cold and exposure.

MOTOR VEHICLES

City Accepts New Combination.

Saginaw, Mich.—On the recommendation of Mayor Paddock the city commissioners have accepted the new Seagrave combination hose and chemical auto apparatus and ordered the purchase price of \$5,200 to be paid. The apparatus has been given several weeks of thorough tests by representatives of the company and members of the department and is in fine running order. The auto will be stationed at No. 6 hose house.

New Truck in Fast Test.

Lewistown, Pa.—The new Thomas fire apparatus made an excellent showing in running tests and was accepted by Mayor O. A. Leopold for the Brooklyn hose company. The truck is a 90 h. p. machine and carries two chemical tanks and a complete fire fighting outfit.

Cities Must Pay Auto Tax.

Sacramento, Cal.—Cities and counties must pay the state auto license fees for their machines, Attorney General Webb holding that the charge made by the Motor Vehicle Act is a license or privilege tax imposed in the nature of compensation for the damage done to the roads of the state by driving motor vehicles and is not a tax upon property. The decision was given to H. A. French, superintendent of the motor vehicle department. This decision was sought by French when the county of Los Angeles refused to pay the license fee fixed in the act. A couple of score of automobiles were affected in Los Angeles and some smaller counties have since taken the stand adopted by Los Angeles. In Webb's opinion, the following section of the law is quoted which defines what municipal and county cars are exempted: "Such self-propelling vehicles as are used neither for the conveyance of persons for hire, pleasure or business, nor for the transportation of freight are hereby exempted." In comment the opinion goes on to say: "It is a matter of common knowledge that many coun-



Courtesy, St. Paul (Minn.) Pioneer Press.

FIGHTING A PAPER WAREHOUSE FIRE IN ST. PAUL

ties and cities own motor vehicles, which for a portion of the time are used by public officials in the performance of public duties and which are for a portion of the time used either for pleasure or for private business. It is not incumbent on the department, however, to determine what part of the time the vehicle is used lawfully in the performance of official duties and what part of the time they are used for other purposes. Any use of a vehicle for the conveyance of persons for pleasure, hire or business, or for the transportation of freight, subjects such vehicle to the payment of the annual license." The law exempts, however, motor propelled vehicles used by the city for police patrol, ambulances, sprinkling wagons and fire apparatus.

GOVERNMENT AND FINANCE

City Manager Carr of Niagara Falls.

Niagara Falls, N. Y.—City Manager O. E. Carr, of Cadillac, Mich., has been appointed city manager of this city by the new council. He will act under the "Plan C" charter adopted at the fall election of 1914. Under the plan four councilmen are elected at large to serve for four years, one half going out every two years, the mayor to receive \$1,000 a year and the other members of the council \$750. These have appointed the city manager, who will have power to designate all appointive officials except the city clerk. The city manager will be held directly responsible for the administration of municipal affairs.

The City Manager of Newburgh.

Newburgh, N. Y.—Fred C. Alber, commissioner of Parks and public grounds of Cleveland, O., has been appointed city manager of Newburgh to serve under the "Plan C" form of government which becomes effective Jan. 1. The appointment was made by the commissioners-elect. The salary is to be \$5,000 a year.

City Manager Plan Wins.

Brownsville, Tex.—By a vote of 229 for to 27 against, Brownsville has adopted the commission form of government. The new charter provides for a city manager at a salary of \$3,000 a year. Albert A. Browne, the present mayor, was re-elected mayor; W. H. Putegnat, E. C. Garcia, present aldermen, and C. H. More and R. B. Renfro were elected commissioners. The mayor and commissioners will serve without salary.

End of Hibbing Tangle.

Hibbing, Minn.—With the withdrawal of the injunction suit brought by the mining companies to prevent the village from proceeding with certain public improvements and the payment to the contractor money due for the work, the last chapter of Hibbing's tax tangle, and the long fight which ensued between village officials and mining officials, has been written. The improvements will be built and the taxes will be the same as last year.

State's Power Superior to City's.

Denver, Colo.—Denver must become "dry" on the first of the year. The supreme court has declared in an opinion by Chief Justice Gabbert against the city's contentions that it is exempt from the operation of the state-wide prohibition amendment and prohibition-enforcement statute by reason of its "home rule" charter. The case, taken before the supreme court by mutual action of the state and city authorities, was considered on a writ of certiorari reviewing the action of the city council in issuing a liquor license extending beyond Jan. 1, the date the prohibition amendment becomes effective. The council's action was taken under provisions of an amendment to the city charter adopted by the people of Denver at the municipal election last spring. The supreme court held, without any qualification, that the prohibition amendment adopted by vote of the people of the whole state in November, 1914, applies to Denver as well as to the rest of the state, and that so far as the regulation of liquor within its boundaries is concerned, any such authority conferred upon the city of Denver by virtue of the "home rule" amendment was repealed by the subsequent prohibition amendment. In answering another point the court

did not decide whether the sale of intoxicating liquor is purely a local and municipal question, as contended by the city, and upon which the city therefore asserted its exemption from the state-wide prohibition amendment. The home rule amendment gives cities exclusive right to regulate their "local and municipal affairs." Even if this were conceded, the court said—although not deciding the point—the prohibition amendment nevertheless would have repealed such authority on the part of the city. The supreme court declared that the right to amend the state constitution lies solely with the people of the whole state and that the people may at any time deprive Denver or any other governmental unit of the state of any authority or power theretofore conferred upon that unit. In answer to the contention of the city that the people of the state is adopting the state-wide prohibition amendment did not mean to deprive the city and county of Denver of its authority under the "home rule" article of the constitution to regulate the liquor traffic within its territorial limits, because in the prohibition amendment there is no express and specific provision depriving it of such authority, the supreme court says that "The intent of a constitutional provision must be determined from its words, as generally used."

STREET CLEANING AND REFUSE DISPOSAL

The Cost of Snow.

Holyoke, Mass.—The recent snowstorm cost the city of Holyoke at least \$3,000. The city had a daily expense of several hundred dollars for men and teams in clearing off the streets and putting them in shape. Henry Winkler, superintendent of outdoor work, had every man and team available in the city on the snow-moving job. The city saved much money by dumping the snow on the playgrounds and the team hauls were greatly reduced. Some objections were raised last year to the dumping on the playgrounds owing to overflowing of water from the melting snow.

Kingston, N. Y.—The heavy rainstorm following the snowfall was of material assistance to the street department, but the removal cost the city over \$5,000. Street Superintendent Van Keuren had a force of over 300 men and about 70 sleighs at work. Garbage collection was delayed several days. The gutters filled with snow caused the flooding of sidewalks on many streets.

Bridgeport, Conn.—The cost to the city for removing the snow from the streets amounted to about \$1,042.14, or at the rate of \$347.38 a day for three days. These figures represented the increases in the street cleaning department payrolls due to the snow removal work.

RAPID TRANSIT

San Francisco Claims Victory in Car Case.

San Francisco, Cal.—Cars of the Municipal Railroad on lines not included in the original agreement with the United Railroads were restrained from operating on lower Market street, in effect by the issuance of a permanent injunction against their use of a loop at the Ferry Building. The injunction was granted in the superior court by Judge James M. Seawell after six months of involved legal procedure. The injunction does not affect lines running to the ocean shore or Golden Gate Park because they were in an agreement made some time ago. Judge Seawell held that the Municipal Railway has equal rights on the two outer car tracks on lower Market street. Because of this, the city claimed the proceedings were a victory for the municipal line, holding that the city could resume operations of the prohibited lines by obtaining permission to use the Ferry loop from the state board of harbor commissioners, or by building a loop of its own. The request for the injunction was made by the United Railroads. At first the case was assigned to Judge Sturtevant, but so much opposition was aroused to his handling it that Presiding Judge Troutt transferred jurisdiction to Judge Seawell. The opposition to Sturtevant was based on the fact that

before he became a judge he was employed as counsel for the United Railroads. The car lines involved continued in operation throughout, although certain transfer privileges were ordered withdrawn by the courts. The operation of the lines resulted in contempt proceedings against Mayor James Rolph, Jr., and four other city officials. T. A. Cashin, superintendent of the city lines, was fined \$250, which he paid, but the legal point involved was appealed. Mayor Rolph and the three other officials were acquitted.

Commission Has Authority Over Massachusetts Railways.

Boston, Mass.—After weeks of deliberation, the public service commission has decided that the Massachusetts authorities have some jurisdiction over the fares of the Bay State Street Railway Co. in this state, even though a few of the routes over which the cars of the company operate extend into other states. Two statements were given out by the public service commission on points relative to motions in the Pay State 6-cent fare case made by Conrad W. Crooker in behalf of William M. Blakeley, president of the Municipal Officers' Association. The first motion questioned the jurisdiction of the commission and asked that the 6-cent fare petition be dismissed and turned over to the interstate commerce commission. The commission has decided that it has jurisdiction. The second motion asked that the evidence of Robert M. Feustel, valuation expert for the Bay State, be barred from the case. In answer to this, the commission says in effect that it is willing to listen to almost anything but reserves the right to determine the weight of any evidence submitted.

Kansas Jitney Men Lose.

Topeka, Kan.—Kansas jitney owners have lost their fight in the supreme court, that body holding that drivers of cars may be restricted as to streets in the handling of passenger traffic. The case went to the supreme court from Wichita. The Wichita ordinance rules that a jitney driver might operate on streets not traversed by the street cars and pay but a nominal license. Operation on the principal streets of the town, however, means a heavy license. The fee ranges from \$25 to \$400 a year. The ordinance was sustained by the Sedgwick county district court and affirmed by the supreme court in an opinion by Justice West. In Wichita it was held that the classification of streets to be used by the jitneys was a proper regulation under the power of the city commission. The ordinance virtually drove the jitney drivers out of business and made competition with the street cars almost impossible. The McKinley interests, which own the Wichita street railway, and the Topeka and Atchison lines and other street railway and interurban companies were keenly interested in the suit and the decision may affect jitney owners in every town in Kansas.

No Eminent Domain for "Dummy" Corporations.

Columbus, O.—"Dummy" public utility corporations do not have authority to exercise the right of eminent domain to appropriate private property for their use, the state supreme court held in reversing the Cuyahoga county common pleas and appellate courts in the condemnation proceedings brought by the Cleveland, Bedford & Geauga Traction Company against the County Home Company and the Parkside Cemetery Association in Bedford to appropriate property for right-of-way. The lower courts had allowed the traction company to appropriate the property, awarding the County Home Company \$1,500 and the cemetery association \$220 for the land proposed to be taken. The County Home Company and the cemetery association contended that the Cleveland, Bedford & Geauga Traction Company is not a valid concern, that it did not intend to use the right-of-way itself, but that it was formed by the Northern Ohio Traction & Light Company for the sole purpose of acquiring the right-of-way, and that the latter company is, in fact, to build and control the proposed traction line, which would enable it to run its cars faster between Cleveland and Akron. The supreme court found this contention to be correct.

LEGAL NEWS

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Injury to Pedestrian on Street—Contributory Negligence.

Morrissey v. Cleveland, C. C. & St. L. Ry. Co.—Mere knowledge by a pedestrian of a dangerous or defective condition of a street does not make it contributory negligence, as a matter of law, to use it, unless it is so dangerous that persons in the exercise of ordinary care would not use it.—Appellate Court of Indiana, Division No. 1, 110 N. E. R., 105.

Care of Streets—Liability of City.

Morrill v. Kansas City.—A municipality is not required to keep its streets free from ruts, and the mere fact that an injured truck driver's wagon wheel went into a rut, he being thrown out thereby, did not render the city liable, unless the rut rendered the street not reasonably safe for travelers exercising ordinary care.—Kansas City Court of Appeals, Missouri, 179 S. W. R., 759.

Damages—Allowance for Interest.

Powelson et al. v. City of Seattle.—Where, in an action for damages caused by the city's negligence in maintaining a drain, the claim is for an unliquidated demand, the amount of which could not be determined except by evidence, it was error to allow interest on the claim from the date of injury, since on such demands interest is properly allowable only from the rendition of the judgment.—Supreme Court of Washington, 152 P. R., 329.

Streets—Rights of Abutting Owners—Discretion of City Council.

Crotts v. City of Winston-Salem.—The owner of property abutting on a street has no greater right in it than the public generally, beyond the right of ingress, egress, light, air, and lateral support. The control of streets is in the governing authority of the city, to decide when and how they shall be improved, and what proportions shall be devoted to vehicles, and what reserved for pedestrians, and courts can interfere only in case of abuse of discretion.—Supreme Court of North Carolina, 86 S. R., 792.

Purchase by City—Inspection—Liability for Price.

Acme Lumber Co., Ltd., v. Board of Comr's of Port of New Orleans.—When the lumber purchased by a municipal board has been inspected, measured and accepted by the inspectors employed by the superintendent of the board, under a contract of sale stipulating that the superintendent or his authorized representative shall be the sole judge of the quality and measurement of the lumber, the board cannot legally withhold the price on the ground that "its inspectors were inexperienced and incompetent, and made faulty, imperfect, and erroneous inspection," unless there was dishonesty on the part of the seller or collusion with the board's superintendent or inspectors.—Supreme Court of Louisiana, 69 S. R., 739.

Warrants—Compelling Issuance.

State ex rel. Jacobs v. Herdman, Treasurer, etc.—Under 27 Del. Laws, c. 220, creating a sewer commission to construct a system of sewers for the town of Newark, and providing that the treasurer of the council of Newark shall act as treasurer of the commission, and that all bills for services rendered by any employee or contractor shall be approved by a majority of the members of the commission and presented to the treasurer, who shall issue his warrant in payment therefor, the issuance of warrant when a contractor's account has been approved by a majority of the sewer commission is mandatory, and may be compelled by mandamus, though there is not enough money in the treasury to pay such warrant, and it is immaterial that the treasurer, who is required to issue the warrant, is also the officer charged with the duty of paying the warrant, as the issuance of the warrant is as much his duty as if he was not also the paying authority.—Superior Court of Delaware, New Castle, 95 A. R., 549.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Dec. 27-Jan. 8, 1916.—SECOND PAN-AMERICAN SCIENTIFIC CONGRESS.—Washington, D. C., Department of State, Washington.

Jan. 12-15, 1916.—AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Annual meeting, Baltimore, Md.

Jan. 17-19, 1916.—MONTANA INSTITUTE OF MUNICIPAL ENGINEERS.—Annual meeting, Billings, Mont. Secretary and treasurer, C. C. Widener, Bozeman, Mont.

Feb. 2-5, 1916.—INDIANA ENGINEERING SOCIETY and the INDIANA WATER SUPPLY AND SANITARY ASSOCIATION. Annual convention, Claypool Hotel, Indianapolis, Ind. Secretary, Chas. Brossman, 1616 Merchants' Bank Building, Indianapolis, Ind.

Feb. 12-19, 1916.—NINTH CHICAGO CEMENT SHOW.—First Infantry Armory and Coliseum, Chicago, Ill. Secretary, Robert F. Hall, Cement Products Exhibition Co., 208 South LaSalle street.

Feb. 15-18, 1916.—SECOND NATIONAL CONFERENCE ON CONCRETE ROAD BUILDING.—Secretary, J. P. Beck, 208 S. LaSalle St., Chicago, Ill.

Feb. 17, 18, 1916.—AMERICAN CONCRETE PIPE ASSOCIATION. Annual convention, Chicago, Ill.

Feb. 28-March 3, 1916.—AMERICAN ROAD BUILDERS' ASSOCIATION. Thirteenth annual convention, including sixth American Good Roads Congress and seventh National Good Roads Show of Machinery and Materials, Pittsburgh, Pa.

May 8-10, 1916.—SOUTHWESTERN WATER WORKS ASSOCIATION. Annual convention, Waco, Tex. Secretary, E. L. Fulkerson, Waco, Tex.

May 10-17, 1916.—NATIONAL CONFERENCE OF CHARITIES AND CORRECTIONS.—Annual conference, Indianapolis, Ind.

June 15, 16.—OHIO SOCIETY OF MECHANICAL, STEAM AND ELECTRICAL ENGINEERS. Convention, Cleveland, O. President, Joseph L. Skeldon, Toledo.

Sept. 8-9.—LEAGUE OF AMERICAN MUNICIPALITIES. Annual convention, Newark, N. J.

American Road Builders' Association.

The date for holding the next or thirteenth annual convention of the American Road Builders' Association has been changed from the week of February 22 to the week of February 28, 1916, the closing day being March 3. This meeting will be the only one of the American Road Builders' Association in 1916. It will also be the sixth American Good Roads Congress to be held under its auspices, and will include also the seventh National Good Roads Show of Machinery and Materials. This show or exhibition will be held in Mechanical Hall, Pittsburgh, Pa., while the sessions of the congress will be held adjoining. The congress will commence on Monday evening, February 28, with the formal opening of the show, and will end on Friday, March 3, the technical sessions commencing on Tuesday morning, February 29, and continuing on Wednesday, Thursday and Friday.

The change in date has been made after careful consideration by the executive committee for several reasons, one of them being to allow more time for putting Mechanical Hall into proper condition. In order to make the repairs and changes necessary for the purposes of the convention, the city council recently appropriated \$15,000. The work to be done will include the

installation of a heating plant and the placing of a concrete floor. The building, which is owned by the city, is situated in the "Point" district at the junction of the Allegheny and Monongahela rivers. Direct railroad connections will facilitate the handling of heavy exhibits, and the location of the building in the downtown business district makes it an especially desirable meeting place.

Pittsburgh can be reached by practically half the population of the United States by a twelve-hour ride. Its facilities for accommodating the delegates and housing the convention and exhibition are excellent, and it is a city of unusual interest to engineers. The time of year selected, it is also felt, will afford many advantages over the season at which former conventions have been held, as it will be an especially convenient time for the contractors, engineers and road officials to be present.

Work on the program has already been commenced by the program committee. It is expected that this program will cover all the live subjects in which road builders are interested, and will be as instructive as it is possible to make it. The speakers will include well-known authorities on the subjects which they will handle.

National Conference of Charities and Corrections.

Arrangements for the forty-third annual meeting of the National Conference of Charities and Corrections to be held in Indianapolis, May 10 to 17, 1916, were discussed by members of the executive committee who met at Indianapolis recently. Tentative plans for holding the conference were gone over with William T. Cross, general secretary of the national conference.

It has been decided to hold the general meetings of the conference in Tomlinson Hall. Sectional meetings and sessions of other organizations which will meet at the same time, will be held in other halls. The general headquarters for the conference will be at the Claypool Hotel, and other hotels will serve as headquarters for the various groups and organizations.

The general sessions probably will be held at night, when speakers of national and international reputation will give addresses on subjects of general interest and import in the broad field of social service work. These will include subjects such as "Modern Improved Methods of Reformatory Work for Offenders," "Child Welfare," "The Protection of the Family and the Community," "Public and Private Charities," "The Promotion of Social Programs," and others.

The program for the conference has not been completed, but among the speakers who have been obtained are the Rev. Francis H. Gavisk, president of the conference; Dr. Katherine B.

Davis, New York; Julia C. Lathrop, Washington; H. H. Shirer, Columbus, O.; W. C. Pear, Boston; Graham Romeyn Taylor, B. B. Burritt and Police Commissioner Woods, of New York City.

Association of American Portland Cement Manufacturers.

At the annual meeting of the Association of American Portland Cement Manufacturers, held in New York on December 15, 1915, the following officers were elected:

President, B. F. Affleck; first vice-president, F. W. Keller; assistant secretary, L. R. Ferguson; treasurer, G. S. Brown; assistant treasurer, John J. Matthes.

Percy H. Wilson, who has served as secretary for a number of years, resigned, and J. P. Beck was elected general manager of the association. The Association unanimously approved of a comprehensive plan for enlarging the activities of the organization submitted by Mr. Beck, and by resolution the executive committee was instructed to carry into operation the proposals in the report.

Mr. Affleck, the new president, is president of the Universal Portland Cement Company; Mr. Kelley is president of the Helderberg Cement Company, and Mr. Hardy and Mr. Brown are respectively presidents of the Dixie Portland Cement Company and Alpha Portland Cement Company. Mr. Ferguson has been connected with the association for some time as assistant secretary. Mr. John J. Matthes is treasurer of the Alpha Portland Cement Company.

Oklahoma Municipal League.

Delegates from many cities of Oklahoma attended the second annual convention of the Oklahoma Municipal League held at Oklahoma City, Dec. 9-10. E. S. Ratliff, Mayor of Ada, who is president of the league, responded to an address of welcome by Mayor Overholser.

Mayor C. A. Lamb, of Bartlesville, vice-president of the league, spoke, explaining the objects and hopes of the league.

An address by Governor Williams was the feature of the opening meeting. In it he emphasized his attitude against politics in city affairs. The Governor referred to the ancient cities of refuge and said that when the municipality of now shall have become what it ought to be, it will be in some respects also a city of refuge. The Governor declared his opposition to political party participation in municipal affairs, and said that he hopes to be instrumental in removing city and county government from party politics.

Commissioner Hugh J. Cooper, of Weatherford, described, at the second day's session, how the municipal ice plant at Weatherford, probably the only one in existence in the southwest, is being run at a great advantage for both citizens and government. Judge J. B. A. Robertson spoke on "The Preferential Ballot for Charter Cities

of Oklahoma," and Mayor Henry D. Lindsley, of Dallas, discussed the problem of the average size city in its development, how to aid this development and how to prevent "relapses."

Among the problems that were discussed at the second day's sessions at Norman were: "The Value of Pure Water and Sanitation," by E. McDonnell, consulting engineer of Kansas City; "Municipal Regulation of Vice," by Jerome Dowd, former editor, lecturer and U. S. revenue collector, who is now head of the sociology department of the University of Oklahoma; "Fire Apparatus," by Commissioner T. J. Quinn, of Tulsa; "Guarding the City's Health," by Dr. J. W. Duke, of Guthrie, state commissioner of public health; "Municipal Regulation of Food Products," by Dr. Edwin DeBarr, state chemist and head of the chemistry department at the state university; "Sanitary Surveys," by Dr. Gayfree Ellison, state bacteriologist and professor in the University of Oklahoma; "The City Manager Plan in Oklahoma," by Mayor C. F. Border, of Mangum, and H. L. Hille, of Collinsville.

Dr. Stratton D. Brooks, president of the University of Oklahoma, addressed Oklahoma mayors on "The University and the State"; Mayor P. P. Duffy, of El Reno, reported on municipal legislation in Oklahoma; C. H. Talbot, of Lawrence, Kan., spoke on "The City of the Future" and on "The Benefits of a Municipal League"; Mayor C. A. Lamm, of Bartlesville, addressed the mayors on "The Oklahoma Municipal League; What It Is, Why It Is, What It Hopes to Be."

Mr. Talbot, in his talk on "City of the Future," said that the spirit of the city should be one of neighborliness. As an example he pointed out that municipalities throughout Kansas are planning municipal Christmas trees to exemplify their "community spirit, democracy and neighborliness." He also urged municipal primaries and elections, the home rule, nonpartisan and municipal primaries and elections, the initiative, referendum and recall and the municipal ownership of public utilities as factors in the upbuilding of cities.

Mayor Val Mullens, of Ardmore, was elected president of the organization for the coming year; Mayor C. A. Lamm, of Bartlesville, vice-president, and John Alley, professor of government of the University of Oklahoma, secretary-treasurer. Oklahoma City was chosen for next year's meeting.

California Water Problems Conference

Considerable headway has been made by the State Water Problems Conference toward putting into definite shape the important work it has been allotted by the legislature of preparing recommendations for the state's handling of all matters concerning the storage, control and use of water.

Papers on water topics were read by Frank Adams, in charge of the irriga-

(Continued on page 995.)

LITERATURE

Publications Received

Smoke Abatement and Electrification of Railway Terminals in Chicago. Report of Chicago Association of Commerce and Committee of Investigation. 1159 pages. Illustrated. Rand, McNally & Co., Chicago. \$6.00.

Principles and Practice of Cost Accounting. By Frederick H. Baugh. 180 pp. Frederick H. Baugh, P. O. Box 682, Baltimore, Md.

Public Service Rates in Texas Cities. By Edward T. Paxton. 141 pp. **University Training for Municipal Administration.** By Herman G. James. 17 pp. Bureau of Municipal Research and Reference, University of Texas, Austin, Tex.

Book Review

A Bibliography of Municipal Government in the United States. By William Bennett Munro. 472 pp. The Bureau of Research in Municipal Government. Harvard University Press, Cambridge, Mass. Price, \$2.50 net.

In the fifteen years which have elapsed since the publication of the "Bibliography of Municipal Affairs and City Conditions" by Professor Robert C. Brooks, there has been an increasing need of a bibliography of the publications in the wide field of municipal enterprise and its many aspects. Special bibliographies and limited selected lists are numerous and very serviceable but they cannot take the place of a bibliography of all the material in one volume. There are about five thousand titles in Professor Munro's book and the entire range is covered completely enough for all purposes under the main headings (with seventy-six subheadings) of General Works, Political Machinery and Direct Legislation, Municipal Organization, City Planning and Public Improvements, Public Utilities, Sanitation and Public Health, Public Safety, Education and General Betterment, and Municipal Finance.

The methods of Professor Munro and the rules guiding his selections are very rational and practical and the result is a volume of distinctive service. There are references to elementary discussions for general readers; to detailed discussions and semi-technical accounts for the special student; and to more elaborate bibliographies for those who wish to refer to all material on any topic. As indicated by the title, emphasis is placed on civic activities in this country, but wherever desirable references are made to municipal conditions abroad. Over three-quarters of the references are to publications issued later than 1905—the author realizing that the rapid development of municipal problems and solutions in the last decade has rendered earlier material of doubtful value. Preference is given to readily accessible items and to official and authoritative data. The fields contiguous to municipal administration, such as sociology, social ethics and sim-

ilar subjects, are treated in such topics as immigration, child welfare, settlements and social engineering in a manner of value to those who follow the broadening trend of municipal affairs. The volume has also been humanized and rendered of contemporary interest by the balancing of references so that the topics of present-day concern are given preponderance.

Professor Munro has done a useful work well—and he has disarmed the criticisms of the special students by having submitted every section of his bibliography to some technical expert or qualified layman considered an authority in his particular field. The names of such men as George C. Whipple, James Ford, G. W. Tillson, Delos F. Wilcox, M. N. Baker, Franklin H. Wentworth, Flavel Shurtleff, John Nolen, Frederick M. Eliot, John A. Fairlie and John R. Commons make the volume as "standard" as it could be. It is to be hoped that another fifteen years will not be allowed to pass before the next bibliography in the field is published—but Professor Munro's volume should well be able to stand the test.

PERSONALS

Durham, Henry Welles, formerly chief engineer of highways in the Borough of Manhattan, New York City, has been appointed engineer of Bergen County, New Jersey. Mr. Durham will retain his office for consulting practice at 366 Fifth avenue, New York.

Smith, Blaine B., general sales manager, Universal Portland Cement Co., Chicago, Ill., has been elected general secretary of the Chicago Association of Commerce. He has served the association actively for several years as chairman of the Illinois committee and until now as chairman of the ways and means committee council.

The following mayors have been elected in Massachusetts: Brockton, John S. Burbank; Fall River, James H. Kay; Fitchburg, Marcus A. Coolidge; Gloucester, Charles H. Barrett; Haverhill, Albert L. Bartlett; Holyoke, John J. White; Marlboro, Louis Farley; New Bedford, Edwin R. Hathaway; Northampton, William H. Feiker; Pittsfield, George W. Faulkner; Quincy, Gustave B. Bates; Springfield, Frank E. Stacy; Taunton, J. William Flood; Waltham, Eben J. Williams.

The following officials have been elected:

Williamantic, Conn.—Daniel P. Dunn, mayor.

Putnam, Conn.—John J. Garry, mayor.

Rockville, Conn.—John P. Cameron, mayor.

Eustis, Fla.—I. N. Kennedy, re-elected mayor; Charles Armsby, city clerk.

Gallatin, Tenn.—H. A. Holder, mayor.

Newport, R. I.—Patrick J. Boyle, mayor.

(Continued on page 996.)

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

HAYTON CENTRIFUGAL PUMPS.

In a Number of Types and Capacities.

The Hayton centrifugal pumps are designed and used for all classes of service, including water supply, high pressure fire service, sewage pumping, drainage and hydraulic pressure. The pump is also made in portable units for contractors' service. The main claims for Hayton pumps are low cost of installation, small floor space needed, adaptability to direct connection to high speed power units of any type drive, steady flow and ease and smoothness of operation.

Type C. S. pumps are of single and multi-stage design, with horizontal split casing and special enclosed type "non-overloading" impellers. The non-overloading feature is so designed that the power consumed under any conditions of variation of head will not exceed the power required under normal conditions by more than ten per cent. This protects the motor from being seriously overloaded under any condition. The single-stage pumps are provided with enclosed double-suction impellers and the multi-stage machines with single-suction impellers provided with relief openings to eliminate end thrust. In each type a marine thrust bearing serves to maintain the impel-

ler in its proper plane of rotation. The angle of the impeller varies at the point of entrance and exit and also the cross-sections of the water passages are designed correctly to take up and discharge the water with the minimum of shock and eddying. Diffusion vanes are not used in these pumps.

The main casing of the type C. S. pumps consists of two parts, the upper half, forming a cover, and the lower half, with which are cast integral the suction and discharge openings and the base. The upper half is provided with intervals and vents and eyebolts for lifting. The joint is provided with a manila paper gasket and taper dowel pins. The casing is regularly made of close-grained cast iron, but may be had in bronze or any special metal. The shaft is of high-grade steel and provided with bronze sleeves to protect it and the stuffing boxes. Bronze bushing rings which fit the impeller with ample running clearance are provided and are so constructed as to reduce leakage back to the suction. The stuffing boxes are of liberal proportions and are water sealed. The bearings are located separately and apart from the pump casing. They are also of liberal size and are provided with two carefully fitted half shells of the vertical split type, lined with high-grade anti-friction metal.

Type C. S. vertical pumps are of similar construction. The main casing, which corresponds to the lower casing in the horizontal type is provided with either lugs for channel iron or with a sub-base for setting on a foundation. The pump may be adapted to submerged service or may be had with an extended shaft.

The capacities of the single-stage C. S. pumps range from 40 to 7,000 g.p.m., and the two-stage from 40 to 4,000.

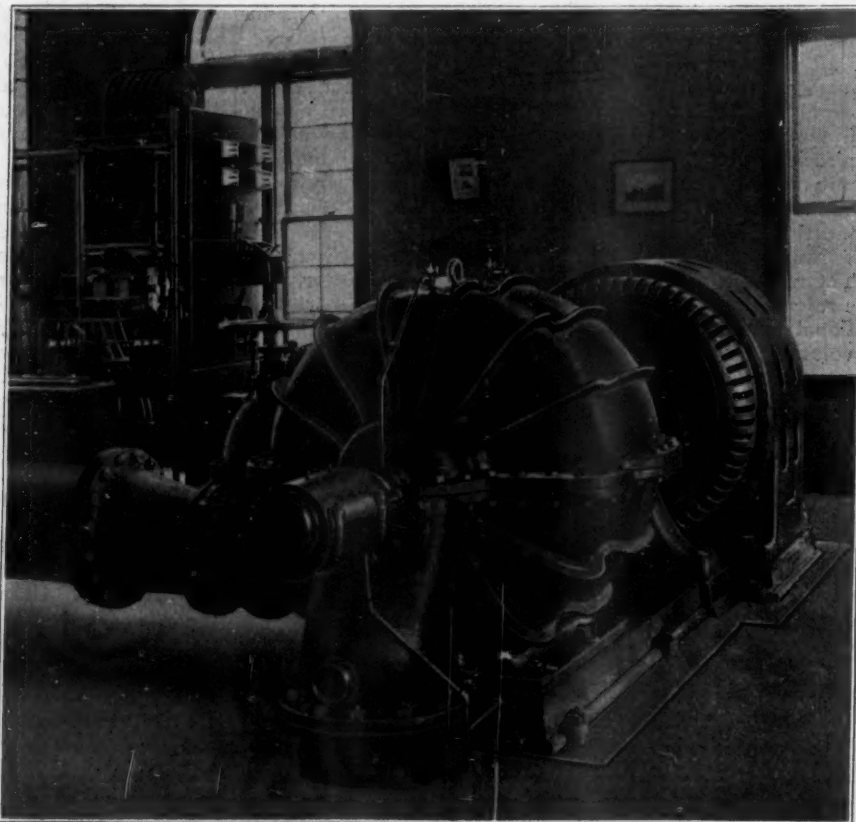
Type M pumps are of simpler design and are moderately priced. They are for heavy duty and are of rugged construction. The discharge in this type may be adjusted to several different positions by removing the flange bolts and turning the volute. This type is furnished only in the single stage, single-suction design. The casing is of close-grained iron and the suction head is cast integral with it. The impeller is furnished either of the enclosed or open type; it is hydraulically balanced against end-thrust and of the same design as in the C. S. type. The maximum capacities range from 14 to 2,500 g.p.m. This type may be had in vertical construction.

The Hayton pump is also made in portable units and mounted direct connected to gasoline engines or belt driven. The former are made with capacities from 200 to 1,000 g.p.m. and the latter 40 to 750.

Type K general service pumps are low price, efficient and simply constructed pumps made with capacities of 14 to 1,100 g.p.m.

The accompanying illustrations show a Hayton 12-inch, two-stage, high-service waterworks pump, direct connected to a 400 h.p. electric motor, having a capacity of 6,000,000 gallons per day against 240 feet total head; and also a type C. S. vertical two-stage pump with sub-base.

The Hayton pumps are made by the Dayton-Dick Company, Quincy, Ill.



HAYTON 6,000,000-GALLON TWO-STAGE WATERWORKS PUMP AND MOTOR.

SEMAPHORES.

For Controlling Street Traffic.

"Safety First" in handling street traffic has made surprising progress in the last few months and a number of cities are installing traffic signals and systems of various types. In developing semaphores for this type of service, Geo. L. Mesker & Co., Evansville, Ind., found a field in which concrete and reliable data of requirements was very slight. A number of experimental semaphores tried out in various tests in actual service determined definitely certain requirements which the designers thought necessary. Among these were:

1. The height of the semaphore

should not exceed nine feet. It was found unnecessary and even undesirable that the semaphore should be seen by all the traffic as the rear vehicles could not start until the first one moved.

2. The "stop" and "go" positions should be clearly indicated by dissimilar shapes.

3. For night service a lantern top should be used, carrying such colors as are easily distinguished from those used for street and window lighting.

4. A lettered panel for night use helps speed up traffic, especially when first introduced and in the case of transient users of the street, who cause most confusion.

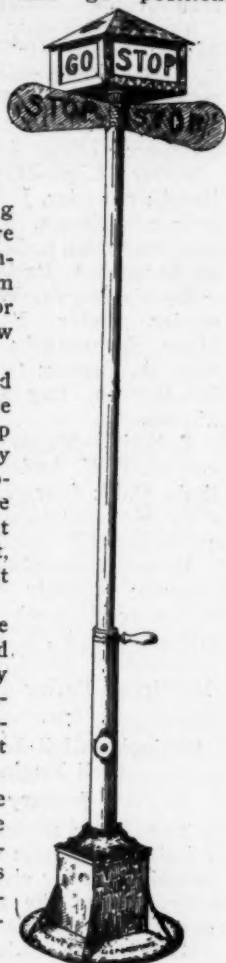
5. An audible signal operated simultaneously with the semaphore helps dispatching traffic at a greater speed.

6. The semaphore should be portable or removable during such periods when traffic conditions do not require it.

With these conditions considered, two types of semaphore were designed and are now in service. One type is for the operation of the light and signal by current from a storage battery and for the other, electricity is taken from the mains under the street. The latter is arranged to be supported over a sub-way box in the pavement.

The battery type is illustrated in the accompanying cut. The upper shaft holding the lantern and arms is rotated entirely by means of a handle, the 1½-inch pipe moving in the 2½-inch pipe of the bottom shaft in a thrust collar construction. Ball bearings make the operation of the shaft smooth and easy.

The semaphore described is made by Geo. L. Mesker & Co., Evansville, Ind.



MESKER TRAFFIC SEMAPHORE.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago—Blue Island, Ill., is buying 400 tons and bids on a similar amount are being asked for by Muscatine, Ia. The American Cast Iron Pipe Company has been awarded 350 tons at Atkinson, Ill. Prices are firmer. Quotations: 4-inch,

\$30; 6-inch and larger, \$28; class A, \$1 extra. Birmingham—All pipe makers report that both the present status and the outlook are good. Indications of big water and gas pipe lettings in the Middle West are increasing. Forward deliveries on pipe are quoted 50 cents per ton above spot. Quotations: 4-inch, \$23.50; 6-inch and up, \$21.50. New York—John Fox & Co., representing the Donaldson Iron Company, are successful bidders on 425 tons for the city of Yonkers, N. Y. It is expected that the city will take about 40 per cent. more than the quantity asked. No further municipal lettings are announced, but an excellent volume of business is being booked from private gas and water companies. It is expected that public lettings will become more numerous after the opening of the new year. Prices are \$1 a ton higher. Quotations: 6-inch, class B and heavier, \$28 per net ton; class A, \$29.

Lead.—Lead is firmly held at the recent advance. Quotations: New York, 5.40 cents; St. Louis, 5.30.

The Goodyear Tire & Rubber Co., Akron, O., announces that the carriage tire department and the fire truck tire department have been combined under one head, Mr. F. H. Sawyer, who has been serving as manager of the latter department, assuming charge of both departments.

To better provide for its rapidly-expanding business, the company is about to establish branches at Salina, Kan., and Cedar Rapids, Ia. Mr. R. S. Herman, who has been representing the company as salesman at Kansas City, is to be manager at Salina. Mr. C. A. Cramer, of the Goodyear force at Des Moines, becomes manager at Cedar Rapids.

The Barber Asphalt Paving Company, Philadelphia, Pa., has just issued a quaint pamphlet entitled "The Asphalt Primer and Colloidal Catechism," which contains in question-and-answer form an easily-understood explanation of the principles of colloidal chemistry as applied to the paving industry. An asphalt mixture, it is explained, must be regulated on the basis of the relation of surfaces and films. The presence of colloidal matter such as has been discovered in Trinidad asphalt enormously increases the surface area of the aggregate and results in a more closely held and thicker film of bitumen about the particles of the aggregate. In this way is explained the "body" of Trinidad asphalt and the toughness and stability of mixtures in which it is the cementing agent. The "primer" is a replica of one of Benjamin Franklin's publications and is illustrated with wood-cuts of ancient and modern highway building.

The Terry Steam Turbine Company, Hartford, Conn., has just issued a new bulletin, "The Terry Turbine," giving a general description of the various turbine applications and dealing particularly with various kinds of high, low

and mixed pressure turbines. Condensing and non-condensing turbines, turbo-generator sets, turbo-pump sets, turbo-blower sets and vertical sets are described and illustrated.

NEWS OF THE SOCIETIES

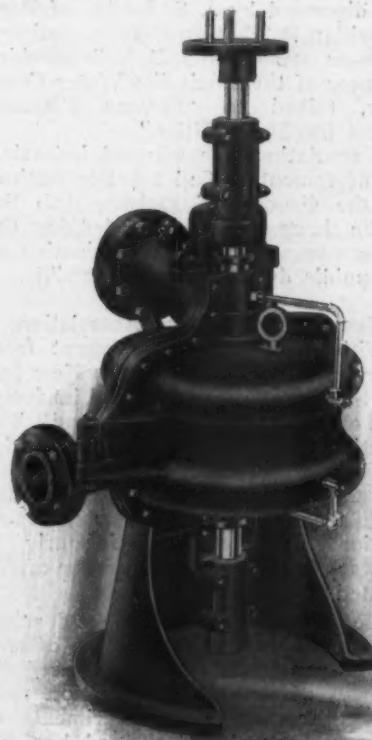
(Continued from page 993.)

tion investigations of the United States Department of Agriculture; L. A. Nares, of Fresno, and A. Griffin, of Manteka, San Joaquin county.

It was decided to appoint separate committees to study the following subjects: Riparian rights, the composition of the proposed centralized administrative board which is to have authority over all state water matters; irrigation, economical diversion and economical use of water; extent to which the state shall assist the financing of irrigation districts; flood control and navigation; municipal use; various conflicting uses of water; underground waters and conservation; storage and dams.

Adams, in his paper, stated that he did not believe there was anything fundamentally wrong with the state's water laws, but thought the policy of the administration of the laws might be improved. He believed there would be no market for irrigation district bonds unless they are issued or guaranteed by the state. If the state issues or guarantees such bonds, the state's control and management of irrigation would logically follow.

Adams suggested conferences of irrigation experts of adjacent states on the subjects of issuance and payment of bonds. He advocated centralized control of water disposition and use.



HAYTON VERTICAL PUMP.

and thought the state department of engineering had taken the first step toward such centralization. He said there were large areas in California which were not taking water, although there was ample water and facilities for delivery.

Conference of Kentucky Health Officers.

City and county health officers from all parts of the state attended their fourth annual conference, which was held at Louisville, Dec. 8-11. The session opened with Dr. J. G. South, president of the Kentucky state board of health, presiding.

The address of welcome was delivered by County Judge Samuel W. Greene and the response was made by Dr. South. A paper entitled "What Has Been Accomplished for the People of Jefferson County by an All-Time Health Officer" was read by Dr. J. I. Whittenberg and Judge S. E. DeHaven, of Lagrange, made an address on "Health Work from the Viewpoint of the People."

The final roll call at the closing session showed 128 of the 135 officers of the state present at one or more of the sessions held. Safe water supplies and the disposal of waste were the principal topics discussed.

Dr. W. H. Frost, of the United States Public Health Service, speaking from a scientific viewpoint of the importance of safe water supplies, said that city and county health officers, as guardians of the public welfare, are responsible in a large measure for the dissemination of proper information on the subject.

"The Prevention of Soil Pollution" was discussed by J. S. Locke, of Barbourville; D. P. Curry, state sanitary engineer, spoke and J. B. Wilson, chief engineer of the Louisville Water Company, talked on "Sewage Disposal Plants for Small Cities."

A resolution was adopted indorsing the movement to find a better method for the disposal of garbage than the public dump system and pledging the officers to assist in the elimination of the public dump wherever possible.

New Jersey Sanitary Association.

With many members present from every section of the state the New Jersey Sanitary Association held its forty-first annual session at Lakewood. The meeting was called to order by Charles J. Fisk, after which William T. Carpenter, a sanitary expert connected with the sewage disposal experiment station, Brooklyn, and formerly of Newark, discoursed on "A Year of Activated Sludge."

He told of the history of the development of this the most modern of sewage disposal methods. He traced the growth of the idea of aeration from the earliest scientific experiments on sewage disposal and showed how experiments in other lines were made to serve the end sought. The address was illustrated by lantern slides.

Following this address Charles McNabb, affiliated with the New Jersey state tuberculosis commission, gave an interesting lecture on the "Foot and Mouth Disease." He told of the development of the disease from the time it is first apparent in an infected animal until death and how improved sanitation will practically always prevent an epidemic of this malady. In the majority of cases, he said, the disease originates in unclean quarters and particularly among animals accorded poor care and sanitation.

Other addresses on the program were by Clyde Potts, of Morristown; W. W. Foster, supervising principal of the South Orange schools; Dr. Calvin M. Kendall, state commissioner of education, and Attorney General J. S. Westcott.

PERSONALS

(Continued from page 993.)

Following were elected in New York: Binghamton.—Frank H. Truitt, mayor; T. O. Watrous, president of council; H. H. Evens, comptroller.

Hornell.—Edward J. Davis, mayor; city chamberlain, Hugo J. Hug; recorder, Harry K. Brown; assessor, Charles Smith.

Oneonta.—Joseph S. Lunn, mayor. Kingston.—Canfield, mayor, re-elected.

Niagara Falls.—George W. Whitehead, mayor.

Gloversville.—Abram Baird, mayor.

Troy.—Cornelius Burns, mayor.

Schenectady.—George R. Lunn, mayor.

The following have been elected in Utah:

Coalville.—Mayor, Axel Blonquist; recorder, Mrs. E. A. Northcott; treasurer, Agnes Farnsworth; four-year councilman, C. C. Wild; two-year councilmen, M. C. Taylor, James Mordy, Lorenzo Sargent.

Park City.—Mayor, A. P. Ridge; recorder, Miss Maud Hurley; treasurer, George W. O'Neill; councilman, four years, Eric Neilson; councilmen, two years, W. S. McFarland, R. H. Billings, George Rosevear.

Richfield.—Mayor, D. P. Jensen; four-year councilman, D. P. Hansen; two-year councilmen, Foster Segmiller, Orsen Christensen, John Hanson; recorder, Edward Krupz; treasurer, Jennie A. Isaacson.

Fillmore.—Mayor, T. Clark Callister; recorder, C. Anderson; treasurer, Viola Rasmussen; four-year councilman, Joseph Anderson; two-year councilmen, A. Sorenson, Peter Beaugard, David Milville.

Morgan.—Mayor, Thomas W. Butters; recorder, W. Visie; treasurer, James R. Rawle; four-year councilman, H. B. Crouch; two-year councilmen, Wallace R. Clark, E. O. Kingston, Thomas W. Fry.

Farmington.—Mayor, John R. Bourne; four-year councilman, George Q. Knowlton; two-year councilmen, Wallace Pragum, David L. Rice, E. B.

Clark; recorder, John R. Walsh; treasurer, Harold Robinson.

Bountiful.—Mayor, Richard Stringham; recorder, Frank Grant; treasurer, Ethel Fearnley; four-year councilman, James Burns; two-year councilman, W. C. Hardy, Frank Jardine, Joseph E. Hepworth.

Kaysville.—Mayor, John G. M. Barnes; four-year councilman, John G. Linford; two-year councilmen, John R. Gailey, W. P. Epperson, Frank L. Layton; recorder, Lawrence B. Coles; treasurer, George Swan.

Heber City.—Mayor, Dr. H. C. Hatch; recorder, J. E. McMullen; four-year councilman, Frank Ryon; two-year councilmen, Isaac Jacobs, George M. Jorgenson, Parl Murdock.

Manti.—Mayor, W. W. Brown; recorder, Peter Peterson; treasurer, Mary Farnsworth; four-year councilman, A. Parton; two-year councilmen, E. Madsen, Ray Dyrent and J. W. Shamp.

Ephraim.—Mayor, C. Willardson, recorder, P. C. Anderson; treasurer, Belinda Dahl; four-year councilman, Andrew Hanson; two-year councilmen, J. P. Hanson, L. Nielson, E. Hanson.

Mount Pleasant.—Mayor, David Rasmussen; recorder, Arthur O. Nielson; treasurer, Hannah Barnett; four-year councilman, A. D. McIntosh; two-year councilmen, M. C. Peterson, W. W. McKiram, Parley Hansen.

Philippine Civil Service Examination. Civil Engineer (Male).

January 18, 1916.

The United States Civil Service Commission announces an open competitive examination for civil engineer, for men only. From the register of eligibles resulting from this examination certification will be made to fill vacancies as they may occur in this position in the Philippine Service at salaries ranging from \$1,800 to \$3,000 per annum, according to qualifications. Competitors will not be assembled for examination, but will be rated on the following subjects, which will have the relative weights indicated:

Subject 1. General and technical education, and preliminary or apprenticeship training; weight: 30. Subject: 2. Responsible experience and fitness; weight: 70. Total: 100.

An applicant for this position must show (1) that he has had not less than three years of preliminary or apprenticeship engineering training or that he is a graduate in engineering from a recognized technical school, and (2) that he has had not less than two years of responsible experience in the design or construction of (a) irrigation or water supply systems, or (b) structural steel and reinforced concrete buildings or bridges.

Persons who meet the requirements and desire this examination should at once apply for Form B. I. A. 2, stating the title of the examination for which the form is desired, to the United States Civil Service Commission, Washington, D. C.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS				
Wash.	Olympia	Jan.	1..Constructing state highways, 5 jobs.....	W. R. Roy, St. Hwy. Comr.
N. J.	Atlantic City	Jan.	1..Paving Meadow Blvd. with Warrenite or other surfacing.....	County Engr.
N. D.	Mandan	Jan.	1..Installing drainage system and paving several streets, estimated cost \$216,000.....	Black & Griffin, Engrs.
Kan.	Hutchinson	Jan.	1..32,000 yds. vertical fiber brick pavts. with curb & gutter.....	G. L. McLane, City Engr.
Tenn.	Maynardville	noon, Jan.	3..Grading and macadamizing several roads.....	G. N. Taylor, Ch. Co. Comr.
Ariz.	Tucson	10 a.m., Jan.	3..One 11-ton steam or gasoline roller and one bin with elevator and engine.....	B. L. Hitch, Clk. Co. Supv.
Fla.	Kissimmee	Jan.	3..Constructing 1-mile sand asphalt road.....	J. L. Overstreet, Clk. Co. Com.
Ind.	Goshen	10 a.m., Jan.	3..Constructing concrete road.....	J. W. Brown, Co. Aud.
Cal.	New Orleans	Noon, Jan.	3..Constructing 2 1/2 miles state highway.....	W. E. Atkinson, St. Hwy. Eng.
Cal.	San Jose	11 a.m., Jan.	3..Improving roads.....	H. A. Pfister, Clk. Co. Supvs.
Ind.	Greenfield	10 a.m., Jan.	3..Grading, paving and improving roads.....	Laurence Wood, Co. Auditor.
Ind.	Fowler	1 p.m., Jan.	3..Grading, paving and improving roads.....	Warren Mankey, Co. Aud.
Ind.	Vevay	1 p.m., Jan.	3..Grading, paving and improving road.....	John Smith, County Auditor.
Ind.	Newport	10 a.m., Jan.	3..Grading, paving and improving road.....	Roy Slater, County Auditor.
Ind.	Williamsport	1 p.m., Jan.	3..Constructing 4 gravel roads; total length, 40,800 ft.....	D. H. Moffitt, Co. Aud.
Minn.	St. Paul	10.30 a.m., Jan.	3..Grading and improving streets.....	August Hohenstein, Pur. Agt.
N. Y.	New York	2 a.m., Jan.	3..2,000 tons refined asphalt, 15,000 cu. yds. asphalt wearing surface sand, 7,000 cu. yds. binder stone, 3,000 tons of limestone dust and 500 tons portland cement.....	M. M. Marks, Boro. Pres.
Ill.	Rock Island	8 p.m., Jan.	3..Grading 8,000 yds. with dirt.....	McEniry & McEniry, State Bank Bldg.
Cal.	Santa Barbara	Jan.	3..Grad. & pav. rd., rock & screenings furnished.....	County Bd. of Supvs.
Cal.	San Gabriel	Jan.	4..Pav. & oil. 11,500 sq. yds. of mac., construct. 24,300 ft. cement walks and making 8,500 cu. yds. of fill.....	City Clerk
Fla.	St. Augustine	Jan.	4..5,000 sq. yds. vitrified brick pavement.....	I. I. Moody, Ch. Co. Comrs.
Ind.	Rockville	11 a.m., Jan.	4..Grading, draining and paving with gravel.....	Chas. Davis, Co. Auditor.
O.	Cincinnati	noon, Jan.	4..Treating macadam, gravel and earth streets with oil.....	Philip Fendick, Dir. Pub. Ser.
Ind.	Vincennes	2 p.m., Jan.	4..Constructing 4 1/2 miles gravel road.....	J. I. Muentzer, Co. Aud.
Miss.	Jackson	Jan.	4..Surface treatment for 5 miles road.....	W. W. Downing, Chancery Clk.
Ind.	Bedford	1 p.m., Jan.	4..Constructing 3 gravel and macadam roads; total length, 2.6 miles.....	E. W. Edwards, Co. Aud.
Ind.	Spencer	2 p.m., Jan.	4..Constructing 2 gravel roads.....	County Auditor.
Ind.	Bloomington	2 p.m., Jan.	4..Constructing gravel road.....	W. F. Kinser, Co. Aud.
Ind.	Monticello	10 a.m., Jan.	4..Constructing crushed stone road.....	County Auditor.
Ind.	Lebanon	2 p.m., Jan.	4..Constructing 4 gravel roads.....	D. M. Clark, Co. Auditor.
Colo.	Denver	11 a.m., Jan.	4..Furnishing materials and constructing concrete pavement.....	J. B. Hunter, Pres. Bd. Pub. Wks.
Ind.	Boonville	10 a.m., Jan.	4..Grading, paving and improving roads.....	G. H. Bass, County Auditor.
Ind.	Crawfordsville	10 a.m., Jan.	4..Constructing township roads.....	B. B. Engle, Co. Aud.
Ind.	Marion	2 p.m., Jan.	4..Constructing stone road.....	E. H. Kimball, Co. Aud.
Ind.	Noblesville	10 a.m., Jan.	4..Constructing concrete, brick or gravel road.....	W. O. Horton, Co. Aud.
Ala.	Huntsville	Jan.	4..Constructing 3 1/4 miles of waterbound macadam road.....	M. S. Bingham, Road Supv.
Ind.	Winamac	noon, Jan.	4..Constructing gravel road.....	W. E. Munchenburg, Co. Aud.
Ill.	Oak Park	Jan.	4..Improv. streets with asphalted conc., curbs & gutters.....	B. C. Brandstadt, Secy. Bd. Loc. Impts.
La.	New Orleans	8 p.m., Jan.	5..Const. creosoted wharf & reinforced conc. causeway with wood block roadway; also creosoted piles and timber.....	J. D. O'Reilly, Engr.
Ind.	Shelbyville	10 a.m., Jan.	5..Grading and constructing 2,269 ft. gravel road.....	F. W. Fagel, Co. Aud.
Mo.	Seymour	Jan.	5..Improving roads; estimated cost, \$30,000.....	Road Commissioner.
Minn.	Red Lake Falls	2 p.m., Jan.	5..Constructing state roads, estimated cost \$3,685.....	Geo. Dupont, Co. Aud.
Ore.	The Dalles	Jan.	6..Constructing roads involving 34,000 cu. yds. rock excavation and 6,000 cu. yds. earth.....	County Court.
Mo.	St. Louis	noon, Jan.	7..Grading and paving streets and constructing sidewalks.....	F. R. Kinsey, Pres. Bd. P. Ser.
Ind.	Crown Point	Jan.	7..Constructing two gravel roads.....	Edw. Simon, Co. Aud.
S. D.	Clear Lake	2 p.m., Jan.	7..Constructing two grades.....	J. M. Wold, Co. Aud.
Minn.	Carlton	10 a.m., Jan.	7..Constructing rural highway (gravel); estimated cost, \$32,885.....	C. D. Conkey, Engineer.
Ind.	Anderson	Jan.	8..Improving 2.75 miles road.....	County Comrs.
Cal.	Ontario	Jan.	10..Improving two streets.....	City Clerk
Ala.	Rockford	Jan.	11..Grading and topsolling roads.....	County Commissioners.
S. C.	Florence	Jan.	11..4,275 sq. yds. reinforced concrete or brick pavement and 2 1/2 miles 5-ft. concrete sidewalks.....	J. N. Johnston, St. Comr.
N. Y.	Albany	Jan.	11..Constructing two highways in city of Rome.....	W. W. Wotherspoon, St. Supt. P. W.
Tex.	Sherman	Jan.	12..Material for roads, which county will construct.....	J. C. Field & Co., Engrs., Denison.
Ala.	Dadeville	Jan.	12..Constructing 38-mile county road.....	G. J. Sorrell, Judge of Probate.
Wash.	Seattle	Jan.	12..Constructing permanent road, cost \$25,000.....	Byron Phelps, Clk. Co. Com.
Mich.	Sault Ste Marie	3 p.m., Jan.	13..Constructing about 24 1/2 miles of macadam roads.....	H. L. Parsille, Co. Clk.
Ida.	Wallace	Jan.	15..Paving and improving streets.....	Robt. Merriam, City Engr.
Washington	Seattle	Jan.	16..Constructing permanent highway No. 12.....	County Commissioners
Wash.	Seattle	Jan.	16..Constructing permanent highway No. 12.....	County Commissioners
Ind.	Ft. Wayne	Jan.	17..Const. 27,200 sq. yds. asph. mac. & 5,175 ft. conc. curb & gutter & making 17,700 cu. yds. of excavation.....	Board of Park Comrs.
Ill.	Evanston	8 p.m., Jan.	17..Laying 71,300 yards brick pavement.....	H. P. Pearsons, Pres. Bd. L. Impts.
O.	Cleveland	noon, Jan.	17..Grading, draining, curbing and paving with brick, concrete, asphalt or bituminous macadam and constructing sidewalk.....	C. E. Burger Village Clerk, Marshall Bldg.
Ia.	Creston	7 p.m., Jan.	20..Laying 25,000 yds. first-class pavement, 16,000 ft. curbing and some storm sewers.....	T. S. DeLay, Consulting Engr.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Md.	Sharpsburg	11 a.m., Jan. 20	Constructing walk on Antietam battlefield	James Canby, Depot Quartermaster, Washington, D. C.
Ia.	Fort Madison	Jan. 25	Constructing 1½ miles concrete and ½ mile of brick pavement	R. J. Lewis, City Engineer.
Ind.	Portland	Feb. 1	Constructing several roads	J. M. Boniface, Co. Aud.
New Zealand	Dunedin	Feb. 9	48,000 sq. yds. wood block, rock asphalt or asphalt paving	Town Clerk.
Kan.	Atchison	Mar. 1	Paving several streets	V. L. King, City Clerk.
SEWERAGE				
Neb.	Wausa	Jan. 1	Sewer system and disposal plant, estimated cost \$12,000	City Clerk.
O.	Mansfield	10 a.m., Jan. 3	Furnishing and placing 85 ft. 18 and 24-in. sewer pipe and making 1,640 yds. of fill	J. N. Case, Co. Aud.
Neb.	Aurora	Jan. 3	Const. drainage ditches with 3,658-ft. clay tile	J. J. Klumb, Co. Clk.
Minn.	Excelsior	7:30 p.m., Jan. 4	Constructing 12-in. storm drain 370 ft. long, 2 catch basins and manholes	F. S. Skemp, Vil. Rec.
O.	Middletown	Noon, Jan. 4	Const. storm & sanitary sewers in 7 sts., about 11,000 ft.	City Commission
Ia.	Hampton	Jan. 4	Constructing sewer system, including 7,100 ft. 8 to 12-in. sewer pipe	P. A. Van Pelt, City Clerk.
Fla.	Key West	Jan. 4	Constructing storm sewer with catch basins, etc.	Harold Pinder, Clk. Bd. P. W.
Col.	Loveland	Jan. 4	Constructing 3,700 ft. 10 and 12-in. sewer	Georgia Rist, City Clerk
N. Y.	Rochester	11 a.m., Jan. 5	Mech. & elec. equip. for Brighton sewage disposal plant	F. X. Pifer, Secy.
Ia.	Mason City	Jan. 6	1,000,000-gal. Imhoff type sewage disposal plant	F. P. Wilson, City Engr.
Ia.	Strawberry Point	Jan. 7	Sewage disposal plant to cost \$20,000	M. Tschirgl & Sons, Engrs., Cedar Rapids.
Mo.	St. Louis	Jan. 7	Constructing 6-in. to 14-ft. diameter sewers	E. R. Kinsey, Pres. Bd. P. S.
Minn.	Duluth	2 p.m., Jan. 7	Constructing county ditch, cost \$7,600	O. Halden, Co. Auditor
Ind.	Bluffton	2 p.m., Jan. 8	Constructing county drains	T. C. Gulden, Supt. of Const.
Ind.	Huntington	Jan. 9	Improving ditch	Andrew Kilty, Con. Comr.
Mo.	Poplar Bluff	1 p.m., Jan. 10	Constructing 4 drainage ditches and one wooden bridge	J. H. Greason, Drainage Engr.
Ida.	Nyssa	Jan. 10	Reclaiming and draining 8,000 acres of land	G. McGee, Chief Engr., Caldwell.
Ind.	Kokomo	10 a.m., Jan. 10	Constructing 12-in. vitrified sewer	W. B. Helmick, Ch. Bd. Pub. Wks.
Ia.	Clinton	Jan. 11	Constructing sewers in several streets	J. G. Thorne, City Engr.
Ariz.	Tempe	2 p.m., Jan. 14	Constructing drainage ditch	J. W. Miller, Ch. Drainage Dist. No. 1
Mo.	Memphis	2 p.m., Jan. 15	Constructing 17.3 miles drainage ditch; total yardage, 557,000	C. J. Wiegner, Eng.
Cal.	Oakdale	Jan. 17	Extending and constructing irrigation laterals; cost, \$20,000	Sec'y Irrigation District.
O.	Cleveland	noon, Jan. 17	Constructing storm and sanitary sewers	C. E. Burger, Village Clerk, Marshall Bldg.
Ill.	Elgin	3 p.m., Jan. 24	Treatment plant & sewerage system for state hospital	F. D. Whipp, Supv. Springfield
Minn.	Crookston	10 a.m., Jan. 25	Repairing and extending county ditch, cost \$7,467	H. J. Welte, County Auditor.
WATER SUPPLY				
Ark.	Beebe	Jan. 1	Water system to cost \$15,000	City Clerk.
Ore.	Baker	Jan. 3	75,000 ft. concrete or vitrified pipe	City Engineer.
Miss.	Pass Christian	Jan. 4	Furnishing and laying 4-in. water main	W. A. Terrell, City Clk.
Miss.	Wesson	Jan. 4	Constructing waterworks and electric light system	Paul Burt, City Clk.
Que.	Montreal	Noon, Jan. 4	Electrically-driven turbine or high lift centrifugal pump with electric motor	Supt. Engr., W. W. Dept.
N. J.	Perth Amboy	8:30 p.m., Jan. 5	Constructing trestle for carrying water main over street	S. J. Mason, City Engr.
Va.	Norfolk	Jan. 8	Constructing 3 dams and spillways	T. S. Purdie, Ch. Bd. of Control.
Pa.	Danville	Noon, Jan. 10	Constructing 300,000-gal. rapid sand filters	Chester & Fleming, Engrs., Union Bk. Bldg., Pittsburgh
Que.	St. Hyacinthe	Noon, Jan. 11	4,000,000-gal. mechanical gravity filter plant	Hector Cadieux, City Engr.
Mo.	Kansas City	Jan. 12	Steam turbine centrifugal pumping unit	J. F. Langan, Pur. Agt.
O.	Cleveland	noon, Jan. 17	Laying 6-in. water main	C. E. Burger, Vil. Clk., Marshall Bldg.
Minn.	St. Paul	10:30 a.m., Jan. 17	Centrifugal or triplex pumping unit with 15,000,000-gal. capacity against head of 171 ft.	August Hohenstein, Pur. Agt.
Tasmania	Hobart	4 p.m., Jan. 24	Supplying and delivering 42,000 ft. of c.i., wrought iron or steel pipe	W. A. Brain, Town Clk.
O.	Farmersville	Feb. 15	Waterworks supplies	A. F. Gilbert, Vil. Clk.
MISCELLANEOUS				
N. J.	Mt. Holly	Jan. 1	Broken stone for 1916	James Logan, Co. Engr.
Minn.	St. Paul	10:30 a.m., Jan. 3	Tools and machinery to equip municipal garage	August Hohenstein, Pur. Agt.
Ind.	Fort Wayne	Jan. 3	Constructing 35 to 50-ton garbage crematory	Board of Works.
Cal.	Manteca	10 a.m., Jan. 3	Constructing three dams at Woodward reservoir; cost about \$165,000	A. Griffin, Engineer.
Minn.	Little Falls	8 p.m., Jan. 3	12-ft. road grader	Victor Schaller, City Clk.
Minn.	New Ulm	5 p.m., Jan. 4	2 steel tanks, 10,000 and 12,000 gals. capacity	F. D. Minium, City Engr.
N. H.	Portsmouth	Jan. 4	Three double-cylinder winches	Samuel McGowan, Paymaster-General.
N. J.	Freehold	Jan. 5	Constructing drain, culvert and 1,000 ft. of bulkhead	G. D. Cooper, Co. Eng.
Ind.	Shelbyville	10 a.m., Jan. 5	1,000 cu. yds. crushed stone	F. W. Fagel, County Auditor.
N. Y.	Utica	Jan. 5	Collection and removal of garbage	Comr. of Public Works
Ia.	Adel	2 p.m., Jan. 5	208,000 pounds reinforcing bars	M. T. Finley, Co. Aud.
D. C.	Washington	Jan. 8	Constructing 400-ft. steel towers at Guam radio station	Bur. of Yds. & Docks, Navy Dept.
D. C.	Washington	3 p.m., Jan. 10	Constructing U. S. post office at Titusville, Pa.	J. A. Wetmore, Supv. Arch.
D. C.	Washington	Jan. 10	Medical supplies for U. S. Army	Medical Supply Depot.
Minn.	St. Paul	10:30 a.m., Jan. 10	Const. marble balustrade and steps at library bldg.	August Hohenstein, Pur. Agt.
Tex.	Lamesa	Jan. 10	Constructing county court house and jail building	G. W. Foster, County Judge.
Pa.	Edgewood	Jan. 10	Collecting and disposing of garbage	W. H. Garrett, Boro Secy., Swissvale
W. Va.	Wheeling	Jan. 14	Furnishing and erecting steel lock gates at Dam No. 14	U. S. Engineer.
Pa.	Philadelphia	11 a.m., Jan. 14	Furnishing 4,600 metal wall lockers	Depot Quartermaster.
Neb.	Sydney	Jan. 16	Constructing city hall; estimated cost, \$20,000	B. M. Reynolds, Arch., North Platte.
D. C.	Washington	Jan. 17	Constructing postoffice at Hackensack, N. J.	Supervising Architect, Treasury Department.
D. C.	Washington	3 p.m., Jan. 18	Constructing post office at Anoka, Minn.	J. A. Wetmore, Supv. Arch.
N. Y.	New York	Jan. 18	Disposing of garbage for 5 years	J. T. Fetherston, Comr. St. Cl.
Ky.	Louisville	Jan. 18	Cement retaining tank	Comrs. of Fisheries, Dept. of Com. Washington, D. C.
D. C.	Washington	Jan. 19	Constructing postoffice at Hornell, N. Y.	Supervising Architect, Treasury Department.
D. C.	Washington	Jan. 21	Constructing postoffice at Waterloo, N. Y.	Supervising Architect, Treasury Department.
D. C.	Washington	Jan. 24	Constructing postoffice at Ashland, Ky.	Supervising Architect, Treasury Department.
D. C.	Washington	Jan. 26	Constructing post office at Shelby, N. C.	Supv. Arch., Treasury Dept.
D. C.	Washington	1:30 a.m., Jan. 27	Constructing post-office at Ellensburg, Wash.	J. A. Wetmore, Act. Supv. Arch.

STREETS AND ROADS

Phoenix, Ari.—Nine specifications for paving have been adopted by commission. They are named in resolutions and from these property owners in each district will make a choice. Resolutions include the following streets: Washington from 7th Ave. to 17th Ave.; Central Ave. from Yavapai to Harrison St.; Jefferson from 7th St. to 16th St.; Jefferson from 7th Ave. to 19th Ave.; 1st St. from Adams to Culver; 7th St. from Jefferson to the McDowell Rd.; 7th Ave. from Washington to Roosevelt St.; 3d Ave. from Jackson to Jefferson St.; Monroe St. from 7th St. to 7th Ave.; Washington from 5th St. to 16th St.; 1st Ave. from Jackson to Yavapai St. The number of yards of paving contemplated in these resolutions is 204,458.

Phoenix, Ariz.—Resolution has been passed by commission for improving portions of Washington St. and 17th Ave.

Sacramento, Cal.—City Commission has ordered improvements on several streets.

Santa Ana, Cal.—Property owners have asked that main road be built from Highland, west of Brookhurst for a mile and a quarter, to connect with Buena Park road.

San Francisco, Cal.—Supervisors have authorized Board of Works to receive bids for improvement of Potrero Ave., between 25th St. and San Bruno Ave., cost being estimated at \$37,875. Board of Work estimates that proposed widening of roadway of Golden Gate Ave. from Market to Franklin Sts., by reducing the sidewalk width, will cost \$11,663. Board has resolved to improve 18th St., between Utah and San Bruno Ave., cost being estimated at \$5,383, and Plymouth Ave. between Broad and Farallones Sts., cost being placed at \$4,710.

San Francisco, Cal.—Plans and specifications have been prepared by engineering department of Board of Public Works and submitted to Board of Supervisors for approval, which will call for construction of new link in the boulevard system. New roadway will connect with extension of Portola drive, connecting link between Junipero Serra and Sloat Blvd., junction being made near Ingleside. Bids will be received by Board of Public Works shortly for grading, paving and otherwise improving of Portola drive from southerly line of 24th St. to easterly line of the San Miguel rancho. The distance to be covered by this improvement is a little over half a mile, and cost about \$20,000. New thoroughfare will be of most approved style of pavement, consisting of 6-in. concrete foundation, which will be covered with a 1½-in. binder course and a 1-in. asphalt wearing surface.

Washington, D. C.—City is discussing plans for widening Fourth St. between Blair Road and Cedar St.

Washington, D. C.—Condemnation proceedings will be instituted at once for widening of Wisconsin Ave. between Garfield St. and District line to a width of 120 ft.

Atlanta, Ga.—Plans are being discussed for paving Ivy St. with coating of asphalt over Belgian block foundation. Cost estimated at \$13,600.

Averyville, Ill.—Citizens have voted bond issue of \$4,000 for improvement of Galena road and \$3,000 for Harvard Ave.

Belleville, Ill.—Following bids were received Dec. 23 for West Main St. improvement: Beet Bros., Belleville, Ind., at \$1.62 per sq. yd., total \$228,468; Hoeffken Bros., Belleville, Ind., at \$1.73 per sq. yd., total \$242,274.50; Chas. H. Degenhardt, Alton, Ill., at \$1.72½ per sq. yd., total \$250,377; J. A. Sturdyoin, Rantool, Ill., at \$1.77 per sq. yd., total \$255,205 (excavation included).

Ottawa, Ill.—The Highway Commissioners of South Ottawa petitioned Board that one mile of road in South Ottawa township on Ottawa-Tonica Rd. be surveyed and estimates furnished. This road is fifth mile of road assigned by Board for improvement under state aid plan.

Ottawa, Ill.—City Commissioners expect to call meeting of owners of property in loop district shortly to discuss plans for resurfacing of entire business district.

Sterling, Ill.—Board of Local Improvements of city of Morrison, which comprises Mayor F. A. Van Osdel, Public Engineer E. O. Hills, and Superintendent of Streets Josiah Hall, held a meeting Dec. 21 in the office of J. A. Riordon,

city attorney, and adopted resolution directing paving with brick of many streets in Morrison. The estimate cost of this work including materials and all lawful expenses, is as follows: 40,830 sq. yds. vit. brick, \$83,293.20; 16,875 cu. yds. excavation, \$10,125; 764 lin. ft. curb, \$382; 87 gutter curbs, \$870; 25 manhole covers, \$25; 16 cast iron catch basin inlets, \$96; court costs, etc., \$5,585.11; total, \$117,887.31.

Danville, Ind.—County Treasurer Geo. Macomber has sold \$14,800 road bonds to J. F. Wild & Co. of Indianapolis, at par, accrued interest and a premium of \$348. Another issue of \$11,600 was also sold to J. F. Wild & Co., at par, accrued interest and a premium of \$267.

Huntington, Ind.—J. F. Wild & Co., of Indianapolis, got \$8,000 bond issued for Tribolet road in Union Township, Tuesday. Four bids were submitted to Dr. A. H. Shaffer, County Treasurer. Wild Co. pays par, accrued interest and \$190 premium. First National Bank of Huntington was one of the bidders.

Indianapolis, Ind.—The paving of Emerson Ave. for distance of 5¼ miles is asked in three petitions filed with the Marion County Commissioners. Work, it is proposed, would be done under three-mile road law. Petitions also ask that avenue be increased in width from 30 ft. to 60 ft. Hearings on petitions have been set for Jan. 4 at 10 a. m.

Kokomo, Ind.—About \$70,000 worth of new gravel road bonds in Center township will be sold next year. According to figures which have been compiled about this amount of money will be available Jan. 1. There are more than enough road petitions on file to take up the amount of bonds that can be issued for two years yet.

La Porte, Ind.—City is discussing paving on Michigan and Indiana Aves. Board of works has been requested to ask bids on asphalt macadam.

New Albany, Ind.—The Mutual Trust & Deposit Co., New Albany, was the only bidder for \$16,000 road bonds and took them at a premium of \$337.25.

Topeka, Kan.—It is estimated that city will spend about \$108,520 for paving during next year.

Topeka, Kan.—City has ordered that alley between Polk St. and Taylor St. from 3d St. to 4th St., in said city, be graded and paved twenty feet wide with 20 per cent vitrified blocks on a 5-in. concrete base with asphalt filler. Also that Chestnut St. from the south line of 8th Ave. to the north line of 10th Ave., in said city, be graded and curbed with combined curb and gutter, and paved 26 ft. wide with 20 per cent vitrified blocks on a 5-in. concrete base with asphalt filler.

Topeka, Kan.—Resolution has been passed for paving Garfield St. from Eighth to Ninth Sts.

Topeka, Kan.—Commission will be petitioned for paving on four streets shortly.

Topeka, Kan.—Commissioners have ordered grading, curbing and paving on Eighth Ave. from Garfield Ave. to Morris Ave.

Louisville, Ky.—Floyd County macadamized road bonds to amount of \$16,000 were sold by Claude A. Sittason, county treasurer, to Mutual Trust & Deposit Co. at premium of \$337.25. Board of County Commissioners in special session approved sale and signed bonds. The bonds are issued to cover cost of construction of Grant Line road No. 3, which extends from St. Joseph road in New Albany Township to Floyd and Clark County line, completing macadamized road from New Albany to county line connecting with improved highways in Clark County. W. F. Woodruff, of Louisville, is contractor, and work on improvement will be begun shortly after first of year.

Louisville, Ky.—Bids for drainage work to be done in First Magisterial District which is expected to relieve serious conditions at St. Matthews and at Longview, on River road, were opened by Fiscal Court Dec. 21, and were referred to committee of district, County Engineer J. Russell Gaines and Engineer S. F. Creelius. Bids were turned over to the latter for inspection, and after he has completed work of figuring up numerous separate features of each bid he will submit them to committee and Engineer Gaines, and it is expected a report will be made on them at next meeting of Fiscal Court and the contracts let for work. Five bids were received for work at St. Matthews and two for work at Longview, bidders for

the former job being Staebler & Gregg, the Butler-Tyler Co., George M. Eady, Henry Bickel Co. and Hoke Co., while the bids on the Longview job were G. R. Gregg and W. F. Woodruff. Engineer Creelius said that from preliminary examination made by him of the bids Hoke Co. was lowest bidder for St. Matthews job at \$2,779.50, and W. F. Woodruff lowest for Longview job at \$3,245.43.

Paducah, Ky.—In annual report which he is now preparing, Commissioner of Public Works L. A. Washington may probably recommend repaving of Broadway from 1st to 5th Sts. Commissioner Washington will not discuss what, if any, recommendation he will make, but it is rumored that he will urge that Broadway be repaved because of its bad condition.

Caldwell, La.—Town will sell \$15,000 road and highway bonds. Bids will be received until Jan. 4, 1916.

Colfax, La.—Money for sale of road bonds for wards 1 and 5 of Grant parish, totaling \$29,500, is now on deposit with Commercial Bank & Trust Co. of Alexandria. All legal requirements having been complied with concerning bonds, arrangements will soon be made to commence road work in both wards.

New Orleans, La.—With a bid of par and a premium of \$5,109.22 the Equitable Trust Co. of New York purchased Wednesday the entire issue of \$1,334,000 paving certificates.

New Orleans, La.—Council has accepted bid of Equitable Trust Co., New York, for \$1,334,000 of paving certificates.

Baltimore, Md.—Paving Commission will let contracts shortly for paving Bond, Fleet, Bush, Russell, Scott, Wilcomico, Calhoun, Ramsey, Mosher, Gilmor, Hollins Sts., Columbia, Wilkens, Frederick Aves.

Lynn, Mass.—A new highway on east shore of floating bridge pond through Addison Ave. will cost \$60,000, according to Street Commissioner McPhetres, who will probably recommend that such a project be dropped, and if new road is needed that it be built nearer shore of pond, where cost would not exceed \$10,000.

Monroe, Mich.—Commissioners are discussing plans for construction of stone road from south to east about \$156,270. Plans and specifications have been made and bids will be solicited shortly.

Gulfport, Miss.—Board of supervisors of Harrison county, Miss., at meeting to be held Jan. 3, 1916, at 12 o'clock noon, will receive and consider bids for \$200,000 bonds of Harrison County, Miss., ordered issued for purpose of building bridges and construction and maintenance of public roads in said county.

Chillicothe, Mo.—Three petitions for paving in north part of city were presented to City Council at a special meeting held Dec. 13. Petitions were for paving of Monroe St. from Polk to Bryan and Monroe St. from Bryan to Irving Ave. and Irving Ave. from Monroe west a distance of 112 ft. Petitioners for both sections of Monroe St. ask for brick while petitioners for Irving Ave. ask for Tarriva. City engineer has been instructed to prepare plans and specifications for improvements of streets, which will be presented to City Council at an early date.

Kansas City, Mo.—The grading of Linwood Blvd. from Indiana Ave. east to Hardesty Ave. will begin early in the spring, according to officials of Park Board. Improvement is known as Linwood Blvd. extension and is 110-ft. single roadway. It begins at Indiana Ave., runs east to Chelsea Ave., northeast to Denver Ave., and east on line parallel with 31st St. to Hardesty Ave., connecting with Raytown Rd.

Sedalia, Mo.—Thomas A. Stanley, highway engineer of Pettis County, in a Sedalia paper Dec. 19, favors county court calling special election in near future to vote on proposition to issue \$500,000 in bonds for construction of additional rock roads.

Butte, Mont.—Resolution announcing intention of city to pave certain streets in downtown district, including portions of Main, Wyoming, Dakota, Hamilton, Park and Quartz Sts. and Broadway has been passed. Resolution also provides for gutters. Following figures were included in resolution: Cost of wooden blocks, \$132.041, \$10.15 per lin. ft.; bitulithic, \$64,960, \$4.98 per lin. ft.; asphalt-concrete, \$48,620, \$3.75 per lin. ft. Where it will be necessary to pave between street car tracks the cost is figured on granite blocks at \$13,145, while

installation of gutters will amount to \$6,416.

Bayonne, N. J.—City Engineer Walter Clarkson has been instructed to prepare plans and specifications for improvements on several streets. Plans will be completed for first meeting in January.

Millington, N. J.—Bernards Township officials are active in making plans for construction of new piece of road connecting Long Hill road with road at Millington Station of Lackawanna Railroad.

Union, N. J.—Town committee Dec. 20 passed resolution petitioning Board of Chosen Freeholders to make Chestnut St. and Stuyvesant Ave. a county road from Roselle Park Borough line to Essex County line.

Mohawk, N. Y.—At a recent meeting of the Town Board of German Flatts, it was resolved that board petition Board of Supervisors to authorize town to borrow money and issue bonds for purpose of paying town's share of improving two state and county roads south of Ilion. These roads will be improved next spring and when completed will be important lines between the typewriter-gun city and the rich farming territory to south. Road No. 14 commences on state route No. 6 at Ilion and extends southerly and westerly over the Barringer Rd. to town of Litchfield, connecting with town macadam; also commencing on state route No. 23 at Harrington's Corners and extending westerly to the intersection of Barringer's Rd., a distance of 1.03 miles in town of Frankfort and 2.73 miles in town of German Flatts, estimated total cost, \$29,000. Road No. 15 commences on state route No. 23 at South Ilion and runs southerly and easterly to town line of Columbia, near Spinnerville, a distance of 2.53 miles all in town of German Flatts, estimated total cost, \$17,800. Town's share of this expense would be \$5,340 and the town's share of the expense for Road No. 14 would be \$6,333.60.

Niagara Falls, N. Y.—Grade crossing commission has been granted permission by common council to issue \$190,000 worth of bonds to pay city's share of eliminating crossings at Portage road, Sugar St. and College Ave. City's cost of eliminating Portage road crossing is estimated at \$55,000, Sugar St., \$80,000, and College Ave. \$55,000.

Ogdensburg, N. Y.—Board of supervisors having decided during session just closed to build Depeyster-Ogdensburg highway in 1916, common council and board of public works are considering plans for improvement of strip of roadway a third of a mile in length, extending from intersection of State and Canton Sts. to town line, where new highway will end. The new brick pavement extends as far as Canton St. intersection, but it is unlikely that balance of road north of town line, where new road will stop, will be paved with brick. Concrete pavement has been recommended and it probably will be decided upon. Another important piece of highway work to be carried out next year will be link connecting Hopkinton and Paul Smith's in the Adirondacks. New highway will be only five miles long, but will be so laid out as to shorten distance between two places 25 miles.

Rochester, N. Y.—City has ordered improvements on several streets.

Schenectady, N. Y.—Residents of Sacandaga Road, Scotia, are discussing paving of section of this street with concrete.

Watertown, N. Y.—City will ask for bond issue of \$53,000 to pave West Main and Virginia Sts.

Greenville, N. C.—Chicod Township has voted \$50,000 bond issue for roads.

High Point, N. C.—City will probably call election shortly to vote on \$50,000 bond issue for street improvements.

Shelby, N. C.—The \$30,000 issue of bonds for good roads in No. 3 township has been sold to First National Bank of this place and work will commence in grading and surfacing of roads as soon as winter weather breaks. Lee W. Lynch, of Rutherford County, is now surveying roads and S. S. Summey, who has had considerable experience in road building in Cleveland, Anson and Lincoln Counties has been engaged to supervise their construction. Commissioners are W. C. Sarratt, chairman, Earl, George B. Patterson, of Patterson Springs, and J. C. Bridges, of Shelby, Route 2.

Washington, N. C.—Town will vote early in January on \$50,000 road bond issue.

Marietta, O.—An ordinance has been passed providing for the issue and sale of street improvement bonds of city of Marietta, O., for purpose of providing funds to pay city's share of cost and expense of improving Phillips St. from East Greene St. to the corporation line by paving.

Marietta, O.—City has ordered improvements on several streets.

Niles, O.—Ordinance has been passed for improving Third St. by grading, draining, curbing and paving same.

Portland, O.—City will sell bond issue of \$97,000 for street improvements.

Springfield, O.—City will ask for bids for street improvements.

Toledo, O.—Bids for more than \$265,000 worth of paving contracts have been opened by Service Director Walters. Contracts will be awarded within a few days as soon as figures of bids are tabulated. Contracts for which bids were opened and engineer's estimates of cost are: Adams, Summit to Ashland, \$63,413.50; East Broadway, Starr to Woodville, \$30,026.70; Horace, Forest to Monroe, \$7,661.30; Kenyon Drive, Glendale to Princeton, \$5,335.45; Locust, Summit to Michigan, \$17,877.80; Michigan, Adams to Madison, \$8,886.10; Oak, Front to Earl, \$49,901.95; Varland Navarre to East Broadway, \$25,333.80; Willard, Nevada to Navarre, \$11,550.70; Yates, Elm to Mulberry, \$12,427.25; Yondota, Nevada to N. Y. Central, \$18,200.20; Wyandotte, Hamilton to Nebraska, \$4,619.70.

Urbana, O.—Council will discuss plans for paving of West Church St. from Urbana Packing Co.'s plant west to Oakland St.

Snow Creek, Okla.—Citizens will vote Dec. 29 on proposition to issue \$20,000 in bonds for improvement of highways.

Portland, Ore.—City is discussing plans for proposed extension of Greeley St.

Pittsburgh, Pa.—Expenditure by county of \$326,167 for improvement of six county roads was recommended Dec. 15 by Grand Jury. Improvements approved were: Spring Run extension road in Moore and Finley townships, 3.4 miles, cost \$65,900; Ammon Rd., Mount Lebanon township, 2.403 ft., cost \$6,659; New England Rd., Mifflin and Jefferson townships, 4.9 miles, \$82,500; Snake Hollow extension Rd., Versailles township, 1.01 miles, \$30,805; Vers Texas and Webster school road, Plum township, 5.61 miles, \$93,679, and the Coal Valley and Large Rd., Mifflin and Jefferson townships, 1.9 miles, \$46,624.

Woonsocket, R. I.—Aldermanic committee on streets and bridges, of which Alderman Charles D. Southwick is chairman, has an appropriation of \$1,800 available for purchase of apparatus for oiling streets.

Columbia, Tenn.—City has ordered paving to be done on several streets.

Columbia, Tenn.—The board decided Dec. 21 to repair streets which have been torn up on account of laying of water mains. Water & Light Co. will bear entire expense of repairing, although work will be done under direction of the city.

Johnson City, Tenn.—Incomplete returns from Washington County Dec. 18 showed that \$450,000 issue of road bonds was passed by majority that is expected to reach 200. Bad weather in country districts made vote low outside of this city. Passage of bonds is attributed partly to this, since people in the country are considered largely against issue.

Knoxville, Tenn.—City will sell bond issue of \$26,188.36 (5 year coupon bonds bearing interest at rate of 5 per cent. per annum, paid semi-annually on Jan. 1 and June 1) for street improvements. Bids will be received in office of City Recorder, Robt. P. Williams, until 12 o'clock noon, Jan. 17, 1916.

Knoxville, Tenn.—Nine bids for construction of permanent roads in Knox county were received at special meeting of the Knox County Good Roads Commission Dec. 15. Just where roads will be constructed has not been decided upon, although they will be the ones that are used more than others. Bids were referred to the engineers for tabulation. Bids received were: Southern Rittuliff Co. and Stone-Graham Co., of Nashville; J. F. Moran & Co., of Atalla, Ala.; Canitol City Construction Co., of Tunalo, Miss.; J. A. Kreis, Hixes & Peck-inbaugh, of Murray Construction Co., of George Dempster and T. E. Plyly of Knoxville.

Rutherford, Tenn.—The voters of Rutherford county by large majority Dec. 14 defeated proposed issuance of \$150,000

of bonds to purchase turnpikes in order to give county free turnpike roads.

Belton, Tex.—Commissioners' Court has ordered set aside \$10,000 for graveling and building a stretch of Rogers and Cyclone road from Bob Bigham farm, in Rogers district. Practically all important roads in this county are now well graveled, or arrangements made for same.

Beaumont, Tex.—Adoption by the City Council Tuesday morning of ordinance ordering paving of Railroad Ave. from Crockett to Forsythe and Crockett St., from Jefferson to Ave. C, 11 blocks in all, marked actual beginning of big street paving plan outlined by city following the issuance of \$85,000 in bonds last May. Plans prepared by city engineer contemplate laying of approximately 5 miles of paving within city limits and no material but Uvalde rock asphalt will be used. The contract for work was let some time ago to Uvalde Rock Asphalt Co. of Beaumont.

Beaumont, Tex.—At meeting of County Commissioners Dec. 17 announcement was made that Liberty-Hardin-Jefferson county road will be built at once.

Corliss, Tex.—Resolutions have been passed for paving on many streets.

Dallas, Tex.—Bids have been asked also for grading Trinity Heights and packing house road and for resurfacing Miller's Ferry Rd.

El Paso, Tex.—Favorable action upon construction of paved road from Country Club to Fort Bliss reservation was taken by County Commissioners at a session Dec. 15 when order was passed authorizing paving with bitulithic. County Judge Adrian Pool was authorized to sign contract with El Paso Bitulithic Co. for paving of road through Ysleta to Socorro and resurfacing of old road to Socorro.

El Paso, Tex.—Report of City Engineer showing estimated cost of paving Federal St. from Dakota to Louisiana Aves. as \$9,326.27 and setting Jan. 27 as date of hearing was adopted. Report of the City Engineer was also adopted estimating the cost of paving Blacker St. from Mesa Ave. to Ange St. at \$23,231.62. Also the report on the paving of West Nevada St. from Los Angeles to Oregon St., estimating the cost at \$5,127.29, and setting the date of hearing on Jan. 27.

Gilmer, Tex.—Upshur County Commissioners have been petitioned to order election on \$150,000 good roads bonds for Gilmer precinct.

Sulphur Springs, Tex.—The election Dec. 18 to issue \$400,000 bonds to build good roads in precinct No. 1 resulted 734 for and 301 against.

Alexandria, Va.—Alexandria Automobile Club took steps Dec. 16 toward having bad stretch of roadway in Prince William county forming part of the Richmond-Washington highway improved by appointing committee to co-operate with Washington committee with this object in view. President W. H. Hellmuth, who presided, named the following: Clyde C. Lamond, Harry D. Kirk, A. D. Brockett, George Washington, Lewis and J. Russell Bolton.

Norfolk, Va.—Property owners of Duke St. have filed with City Clerk Steed petition for smooth pavement on that street from Bute to Olney road extended.

Bridgeport, W. Va.—Voters may be asked to vote on a million dollar bond issue at fall election next year. Industrial and agricultural interests are back of movement. It is said that the money will be used for road improvements and is in line with other counties in state.

Olympia, Wash.—First contracts for state road work to be let will come before State Highway Board Dec. 20. There are five separate jobs to be decided upon. Cost of work, according to estimate of engineers, will approximate \$125,000. Stretches to be improved are all on Inland Empire highway, on east side, and are as follows: Pullman county, 8½ miles; Whitman county, grading; estimate, \$29,460. Rosalia to Oakesdale, 9 miles, Whitman county, grading; estimate, \$27,960. Touchet to Wallula, 9½ miles, Walla Walla county, grading; estimate, \$33,611. Kennewick westerly, 11.6 miles, between Kiona and Richland, grading, Benton county; estimate, \$25,576. Wenatchee-Orondo, 12 miles, graveling; estimate, \$8,000.

Sheboygan, Wis.—Council has ordered bids to be asked for street flusher.

CONTRACTS AWARDED

Los Angeles, Cal.—To Geo. H. Oswald for improvement of Griffith Ave. by asphalt pavement, cement curb, cement

sidewalk, concrete gutter, culverts and sewers. To H. O. Withers for improvement of Effie St. and Arvia St. To Calvin McCray for improvement of Dexter St. To Walter Overell for improvement of Edward Ave.

Los Angeles, Cal.—Contract has been awarded to M. T. Shafer at \$7,495 for improvements in roads.

San Francisco, Cal.—To Owen McHugh for improving 24th Ave., between Balboa and Cabrillo Sts., for \$9,979.

Tampa, Fla.—Contract was let Dec. 21 by board of public works to E. G. Proudfoot, of Chicago and Miami, for laying of some 140,000 sq. yds. of asphalt block pavement on a number of streets in this city at a cost of \$1.65 a sq. yd. The block is to be 3-in. size. Total contract amounts to approximately \$300,000. Mr. Proudfoot made bond of \$100,000 to guarantee completion of the work. Mr. Proudfoot, in submitting bid to board Dec. 20 made the statement that should he be granted contract he would put up an asphalt block manufacturing plant in this city at outlay of about \$100,000. He said he has much faith in future of this class of paving in Florida and expects to install plant that will supply product throughout this state and section of the country.

Delphi, Ind.—For constructing system of roads in Clay Township by Carroll County Commissioners to William Mantley, Frankfort, at \$18,973.

Shoals, Ind.—By Commissioners of Martin county for highways, as follows: Center and Perry township roads, Fretress & Case, French Lick, Ind.; Halbert township road, Geo. Green, Shoals.

Spencer, Ind.—By Commissioners of Owen county, Geo. W. Stwalley, Aud., to John E. Doak & Harley Nelhart, at \$1,846.60, for grading and paving.

Des Moines, Ia.—By City Council to Lincoln Place Investment Co. for about 18,319 sq. yds., more or less, paving on Lincoln Pl. and 31st St.; also for 12,572 lin. ft., more or less, curbing on said streets.

Newton, Kan.—For paving about two miles on North and South Main St., to A. Jacks Construction Co., American Bank Bldg., Kansas City, Mo.

Dayton, Ky.—To Louis H. Mendt, Newport, Ky., for 2,700 sq. yds. of bituminous macadam pavement at \$1.30 paving per sq. yd. and 35 cts. excavation. Other bidders were: Vastine & Nowlands, Covington, Ky., at \$1.35 paving, 50 cts. excavation. C. J. Helm, Ft. Thomas, Ky., at \$1.32 paving, 40 cts. excavation. N. S. Glazier is City Engineer.

Napoleonville, La.—The police jury Dec. 21 closed with Alexander Gravel Co. for \$30,000 gravel, which will complete gravel road in this parish on Bayou Lafourche and give a clean stretch of hard-surface road from Labadieville to Donaldsonville on either side of the bayou.

Gloucester, Mass.—For road construction by state highway commission, Boston to T. A. Moynihan, South Hamilton, at \$30,423.

Kansas City, Mo.—For paving 17th and Bellevue St., to A. Jacks Construction Co., American Bank Bldg., Kansas City, at \$5,450 and \$4,633, respectively.

Bayonne, N. J.—For improving Ave. A, to Illinois Surety Co., 170 Broadway, New York, N. Y., at \$6,668.

Hackensack, N. J.—To Franklin Van Roden, East Rutherford, at \$18,560, for improving Meadow Rd. and Rutherford Ave.

Perth Amboy, N. J.—George's road, or Cranbury turnpike, as it is also known, is to be improved from New Brunswick city line to Kingston lane, a distance of 7.772 miles. Abraham Jelin, of this city, was lowest bidder, with an estimate of \$168,835.15. Other bidders were as follows: Utilities Construction Co., of this city, \$185,680.03; Liddle & Pfeiffer, of Perth Amboy, \$187,847.94; T. Harry Riddle, of this city, \$178,706.74; M. Irving Demarest, of Sewaren, \$180,523.36; Meagher & Smith, of Perth Amboy, \$187,448.95; Thomas F. Dunigan, of Woodbridge, \$187,983.34; H. N. Scott Contracting Co., of Cranbury, \$186,821.98.

Syracuse, N. Y.—Antonio Sposato was lowest bidder at \$1,596 for grading Crockett St. from Beverly road to South Geddes St.

Syracuse, N. Y.—Proposals were received Dec. 20 by Board of Contract and Supply for largest sidewalk contract awarded in several years. It amounted to nearly 30,000 sq. ft. Walk is to be 5 ft. wide on both sides of Spencer St. from North Clinton St. to Sand St. Mondo Construction Co. was lowest bidder at 9 cts. a sq. ft., a total of \$2,679.

Syracuse, N. Y.—Mondo Construction Co. has been awarded contract for building a 5-ft. sidewalk on both sides of Spencer St. from North Clinton St. to Sand St. at \$2,679, for grading Crockett St. from Beverly road to South Geddes St. at \$1,596, and for grading Barry St. from Onondaga Ave. to Haywood St. at \$600.

Philadelphia, Pa.—For surfacing Tyson St. and repaving Terrace St. to Union Paving Co., 112 N. Broad St., at about \$32,300.

Dallas, Tex.—Contract for paving Bishop Ave. from Davis to Sixth St. was awarded to Standard Engineering Co., Dec. 17, at a bid of \$12,405. Same company has contract for paving Bishop from Jefferson to Davis at cost of \$18,000, making \$30,000 involved in improvement.

SEWERAGE

Rogers, Ark.—Letting for sewer construction has been indefinitely postponed.

San Francisco, Cal.—Of the ten bids for construction of sewer in South Bay view district, which Board of Works received Dec. 15 lowest was filed by Tibbitts Pacific Co., its price being \$35,900.

Jacksonville, Fla.—City is discussing plans for construction of new sewers and drains.

Key West, Fla.—John J. Quinn and John R. Pearson of Bedford, Ind., have applied for franchise to construct sewer system.

Okemah, Okla.—City is planning to vote on bonds to construct sewer system, waterworks and electric light plant; estimated cost, \$50,000. Plans are being prepared by Southern Utilities Co., Jacksonville.

Alton, Ill.—Plans are being discussed for building of proposed Shields St. sewer. Address City Engineer.

Quincy, Ill.—Report of Board of Public Works, giving an estimate of cost of repairing sewer at Third and Cedar, was accepted and recommendations ordered concurred in. Board was given permission to advertise for bids for construction of sewer. The estimate cost was placed at \$672.50, and includes cost of laying 190 lin. ft. of 36-in. brick sewer, starting at Third and Cedar and extending in a southwesterly direction.

South Bend, Ind.—A. M. Smith of Elkhart, filed his contract and bond for installing sewer on Wenger Ave. They were referred to City Attorney R. H. Jernegan.

Des Moines, Ia.—Plans are being prepared for 8 miles of sewers. F. Carrs, City Hall, is city engineer.

Keokuk, Ia.—Council is discussing plans for construction of sewer system.

Lexington, Ky.—Mayor J. E. Cassidy called joint meeting Dec. 21 of incoming and outgoing City Commissioners, Board of Health and sewage disposal committee of Clean City Club to confer with two representatives from government sanitary service located at Cincinnati. The men who reported to Mayor yesterday are Dr. W. H. Frost, passed assistant surgeon, and R. T. Tarbett, sanitation engineer, who come here at direction of Surgeon General Rupert Blue. They will inspect sewerage system of city during present week and suggest what disposal system they think should be purchased with \$350,000 voted by the people at last election for that purpose. The men reported also to Dr. W. O. Bullock, president of the Clean City Club.

Hagerstown, Md.—City is planning installation of sewerage system. Bill has been approved by Council and will go to Legislature shortly.

Holyoke, Mass.—One of the recommendations to board of aldermen which will be made by claims committee shortly is that two catch basins be placed in Springfield road near home of Hormidas Demers.

Winchendon, Mass.—Citizens have voted \$15,000 bonds for sewer system.

Beltrami, Minn.—Contract for construction of judicial ditch No. 36, one of big drainage projects under way in Northern Minnesota, has been awarded to Johnson & Baum of Superior, on their bid of \$194,238.62. The ditch is 125 miles long and is located in Beltrami and Koochiching counties.

South St. Paul, Minn.—Property owners on streets off line of trunk sewer to be laid in Second Ward, South St. Paul, this winter, are bestirring themselves in an effort to have lateral connections extended as soon as main pipes are laid.

Bids will be sought at an early date for laying of lateral sewers on Fourth and Fifth Aves. south from Marie Ave. to connect with the trunk system on Third St. south. Other streets will be included in extensions later. Work on trunk sewer on Third Ave. and Third St. will be begun early in January by Tanner Bros., St. Paul contractors. Their contract calls for the construction of work in May.

Billings, Mont.—City engineer's office has completed preliminary design and estimate of cost of storm sewer system for north side of city, including district between Burlington railway on 5th Ave. north and Northern Pacific right of way, and extending from North 19th St. on east to 4th St. west. Report on the same will be submitted to city council at its next meeting. Cost of main trunk sewer is estimated at \$28,000, and that of branch extending to west side at \$35,000.

Freehold, N. J.—Bids for construction of concrete drain under Norwood Ave., Long Branch, were received by Board of Freeholders at meeting of body yesterday and referred to committee for tabulation and report at special meeting to be held Dec. 29. Marcellus Quackenbush of Long Branch was low bidder for job, asking \$1,237. Six other bids were received, as follows: Joseph Finn, Long Branch, \$1,287; James J. Hogan, Red Bank, \$1,392.50; Lewis J. Sieling, Red Bank, \$1,484; Jennings-Laughlin Co., Inc., Sewall Ave., Asbury Park, \$1,553; James Norman & Son, Red Bank, \$1,632; Owen J. Melee, Seabright, \$1,700.

Albany, N. Y.—Ordinance has been passed for sewers in Livingston Ave. and in Rawson St.

Rochester, N. Y.—City has ordered construction of sewers on several streets.

Niles, O.—Ordinance has been passed or constructing sanitary sewer on Railroad St.

Durham, N. C.—Gilbert C. White of Charlotte, N. C., and Durham, has been engaged by city to report on conditions as to sewage disposal from north side of city.

Lillington, N. C.—City is planning construction of sewer system and waterworks. Address the Mayor.

Salisbury, N. C.—Board has sold \$200,000 bonds for sewers, water-works and improving streets.

Dayton, Ohio.—Director of Public Service is preparing plans for storm sewers.

Dayton, O.—Manning B. Shannon, Finance Commissioner, will sell \$250,000 sewage disposal plant bonds early next month.

Delaware, Ohio.—City Council is contemplating new sewerage disposal plant.

Greenville, O.—City Engineer Horn has prepared plans for the proposed trunk sewer and laterals. Cost will be about \$60,000.

Milford, O.—State Board of Health has ordered village to construct a general sewer system.

Youngstown, O.—City will advertise for bids for constructing sewer in Hartford Ave.

Youngstown, O.—City will advertise for bids for improvement of Elberon St. by grading and draining same.

Beaver, Pa.—Bond issue of \$1,700 has been declared by West Bridgewater borough. Purpose is to provide funds for construction of storm sewer in Leopard Lane. Ordinance to this effect passed final reading Dec. 20.

Providence, R. I.—Following public hearing at City Hall Dec. 22, City Council committee on sewers voted to recommend construction of sewers in 12 streets and of storm sewers in two other highways. Recommendations will be sent to Common Council Jan. 3.

Dallas, Tex.—Bids on storm sewer work on Bishop, Eighth and Ninth Sts. in Oak Cliff were called for Dec. 17 by Board of City Commissioners upon recommendation of Commissioner Lang. It is estimated the work will cost \$5,000.

Dallas, Tex.—City Commissioners Dec. 17 passed finally ordinance providing for sale of \$250,000 bonds. Bidding will close Jan. 17. Bonds to be sold are part of \$550,000 issue voted for sewage disposal plant two years ago.

Gatesville, Tex.—City has voted \$22,500 bonds to construct sewer system. Address the Mayor.

CONTRACTS AWARDED.

Los Angeles, Cal.—For sewer in Grifin Ave. to P. S. Tomich, at \$11,500.

Sacramento, Cal.—To F. E. Frev for sewer improvements on Freepoint road.

San Francisco, Cal.—Contract for constructing system of large sewers in the

South Bay View district, according to city engineer's plans, was awarded Dec. 20 by Board of Works to Tibbitts Pacific Co. for \$30,128.

Washington, D. C.—By Dist. Comrs. for sewers as follows: Kenilworth sewer to Harper & Voigt, 717 14th St., N. W., \$15,146. Petworth sewer to Chas. H. Tompkins Co., 1883 3d St., N. E., \$2,000. Sewers on Reno Rd. and Tilden St., Warren F. Brenizer, 141 Q St., N. W., at \$1,797 and \$2,349, respectively.

Pensacola, Fla.—To Chas. Born Co. for laying 1,400 lin. ft. of sewer pipe at 20 cts. per ft. Other bidders were John Gerkins at 3½ cts., and Wicke Bros. at 2½ cts.

Cherryvale, Kan.—To Attell & Oldham for sewer tile at \$14,401.

Boston, Mass.—By Met. Water and Sewerage Board, for brick and concrete sewers, to Bruno & Pettite, 18 Tremont St., Boston, and to Bay State Dredging & Contracting Co., 247 Atlantic Ave., Boston.

Camden, N. J.—For sewer in Pensauken Township, to W. Penn Corson, at about \$10,000.

Plainfield, N. J.—Contract for construction of sewer on North Grove St. was awarded to Smith & Conyne, of Newark, by members of Borough Council, at their meeting Dec. 20, held for that purpose. Bids received were as follows: Hickey & Houghton, Somerville, \$2,873.06; T. H. Riddle, New Brunswick, \$2,354.60, and Smith & Conyne, Newark, \$2,275.38.

Ridgefield Park, N. J.—For sewer system in West View Section, to Di Napoli & Turiello Construction Co., 11 Broadway, Hackensack, \$27,765.

Buffalo, N. Y.—To Jos. F. Stabell Construction Co., Niagara St., at \$110,639, for brick sewer in Swan and Seneca Sts. Geo. H. Norton is City Engr.

Mt. Vernon, N. Y.—To Fred W. Burnham, 30 East 42d St., New York City for sewer work. Owner, New York Central R. R. Co., Grand Central Terminal, New York City.

Enid, Okla.—Following bids were received Dec. 18 for vit. sewer pipe: J. A. Ham, for 140 ft. of 6-in. pipe, \$155.70, for 4,446 ft. of 8-in. pipe, \$4,014.10; G. A. Broesamle, for 140 ft. of 6-in. pipe, \$151.66, for 1,556 ft. of 8-in. pipe, \$1,707.20; Wm. Black, for 140 ft. of 6-in. pipe, \$158.79; for 4,446 ft. of 8-in. pipe, \$4,915.16; G. W. Morton, for 140 ft. of 6-in. pipe, \$160.81, for 1,826 ft. of 8-in. pipe, \$2,268.50.

Fort Sam Houston, Tex.—To H. C. Gass, San Antonio, Tex., at \$7,395, for sewer construction. The following is a list of work covered by specifications under this heading: 410 lin. ft. of 8-in. salt glazed vitrified clay pipe sewer; 5,295 lin. ft. of 6-in. salt glazed vitrified clay pipe sewer; 990 lin. ft. of 6-in. galvanized steel pipe sewer; 115 lin. ft. of 4-in. salt glazed vitrified clay pipe sewer; 1,300 lin. ft. of filter distributing drains; 14 concrete manholes; 1 flush tank (antiseptic tank). Capt. G. E. Stewart, Q. M. Corps, is Constructing Quartermaster.

Seattle, Wash.—For sewer system in Mead St. and 51st Ave., to Washington Paving Co., Smith Bldg., Seattle, at \$78,694.

WATER SUPPLY

Miami, Ariz.—City has voted to sell \$30,000 bond issue for purpose of purchasing municipal water system.

Pasadena, Cal.—Among things to be done in connection with general plan for water works betterments has been construction of another and larger reservoir on northside. This reservoir is to be located at municipal poppy fields, near Sheldon wells. In order to keep men at work, water department will at once build this big reservoir, and when it is done old Painter reservoir will be bypassed and demolished. Proposed Sheldon reservoir ultimately is to be one capable of holding 12,000,000 gallons of water. It is to be a twin reservoir; that is, a reservoir in two parts, each part holding 6,000,000 gallons. But one part will be built at this time, but this work will keep men and teams at work for a long time and will aid in keeping workers off roll of unemployed as well as to preserve street department organization. First of the twin reservoirs will be of concrete and will easily handle territory to be supplied. Another "twin" will be built later, so that one can be used when the other is being cleaned out.

San Bruno, Cal.—City will call election shortly to vote on \$35,000 bond issue for water mains.

San Diego, Cal.—The city attorney was instructed by Council Dec. 14 to prepare contract with Charles M. Hatfield, whereby latter is to fill Morena reservoir to overflowing by Dec. 20, 1916. If Hatfield succeeds in his undertaking city is to pay him \$10,000 cash.

Waterbury, Conn.—City Engineer R. A. Cairns appeared before board of aldermen last night and asked for issue of \$100,000 of water bonds, money to be used during coming year in preparatory work for construction of a new storage reservoir.

Galesburg, Ill.—All bids for 15-inch tubular well 2,500 ft. deep, have been rejected on account of being too high.

Galesburg, Ill.—Council will reject all bids for sinking of new artesian well at water works plant. Plans will be modified and new bids asked for shortly.

Bicknell, Ind.—City Council has granted a franchise to George W. Harr, South Bend, to construct and operate water works plant, to cost about \$150,000.

Keokuk, Ia.—City is contemplating installation of new waterworks plant next year.

Georgetown, Ky.—City Council reported to be contemplating construction of electric light plant and water works system.

Crowley, La.—City Council has opened bids for \$35,000 electric light and water works bonds, that of the Provident Savings Bank & Trust Co., of Cincinnati, being accepted.

Salem, Mass.—Council has awarded \$120,000 water bonds to Curtis & Sanger.

Springfield, Mass.—Water Commissioners are making plans for installation of new pump at pumping station, but they have not decided what kind of pump they will install. Pump which is being used now is nearly 30 years old and life of it is nearly gone. Steam power is used to run pump and expense has been quite heavy. Board are looking into matter of driving pump with electrical power, and although initial cost of installation would be somewhat higher, it is figured that in long run cost would be reduced.

Albion, Mich.—Following bids have been received for waterworks supplies: Fred Schumacher, Albion, Mich., at \$7,688, and Weston Bros., Albion, at \$11,072.31.

St. Paul, Minn.—City is planning to enlarge St. Paul's water plant at cost of \$500,000. Improvement in plant will include construction of two reservoirs at north city limits, increasing storage capacity by 15,000,000 gals. Screening devices and other facilities deemed necessary to maintain quality of the city's water also will be installed. Plans are being made by expert in water department.

Wesson, Miss.—\$18,000 water and light bonds have been sold by Mayor. Bids for constructing system will be opened Jan. 4.

Asbury Park, N. J.—Avon Council Dec. 20 passed so-called paving, sewer and water ordinance requiring property owners to lay lateral connections in Main St. in preparation for permanent pavement of that thoroughfare.

Linden, N. J.—Twp. Committee Dec. 20 authorized Clerk Frank Anderson to advertise for bids for motor triple combination pumping engine. Sealed proposals will be received and considered on Friday, Jan. 7. Resolution was passed providing for issuance of \$20,000 in bonds recently authorized.

Goshen, N. Y.—Town is discussing question of obtaining water supply.

Lockport, N. Y.—State Commissioner of Health has urged installation of modern filtration plant.

Newburgh, N. Y.—On the eve of disbandment, through completion of Catskill aqueduct system, Board of Water Supply of New York City Dec. 23 applied to Board of Estimate for authorization to develop watershed of Schoharie Creek as an additional water supply. Estimated cost of the project, which would supply an additional 250,000,000 gallons of water a day, was stated to be \$22,175,400. Board of Estimate set Jan. 14 as date for a public hearing on matter.

Niagara Falls, N. Y.—Superintendent of waterworks has been authorized to lay main in 35th St., from La Salle Ave. 550 feet north, at estimated cost of \$800, subject to approval of estimate board.

Lillington, N. C.—See "Sewerage."

Chardon, O.—Chardon Water Works Co. will let contracts in spring of 1916 amounting to \$40,000. C. H. Tilton is Secy.

Cleveland, O.—Council has approved ordinance to issue bonds in sum of \$500,000 for installation of waterworks system.

Lorain, O.—Following bids were received Dec. 17 for furnishing water works supplies: The D. Connelly Boiler Co., Cleveland, O., at \$14,746; Union Iron Works, Erie, Pa., at \$13,112; Babcock & Wilcox Co., Cincinnati, O., at \$12,345. Ira A. Richards is director of public service.

Youngstown, O.—An ordinance has been passed to make contracts with various companies submitting successful bids to village for installation of water system.

Baker, Ore.—Ordinance has been passed to sell \$75,000 water bond issue. Bids will be received until Jan. 17.

Harrisburg, Pa.—Flood prevention plans for city of Erie prepared by Farley Gannett, hydraulic expert of city, were approved Dec. 16 by Water Supply Commission. Following thorough examination of the blue prints and explanations, Charles E. Ryder, commission engineer, recommended approval. With the sanction of the Water Supply Commission granted, Council is now empowered to go ahead with the work or pursue its plan to let the next administration handle the problem to its conclusion. Plan will cost more than \$900,000.

Lancaster, Pa.—Plans have been approved by City Council for improvements to the municipal water works system providing for installation of two electrically driven centrifugal pumps. Cost will be about \$60,000.

Philadelphia, Pa.—Ordinance was approved Dec. 13 for laying of water pipe in following streets: Allman, Angora, Arch, Beulah, Bonsall, Bucknell, Chew, Darien, "E," Fairhill, Franklin, Fourth, Howard, Hoy, Jackson, Malta, McKean, Mildred, Mitchell, Nassau, Percy, Rand, Ritner, Ruscomb, Russell, Sheridan, 13th, 26th, 27th, Westview and Wolf Sts., Belfield, Geneva, Laycock, Park and Snyder Aves, Marwood and Westford roads and McKean Parkway.

Columbia, S. C.—Water and sewer extension bonds amounting to \$503,000 will be sold shortly by city. G. F. Cooper is City Clerk.

Dresden, Tenn.—Town of Sharon, eight miles southwest of Dresden, has just voted a bond issue of \$25,000 for installation of a water and light plant—\$15,000 of amount for water and \$10,000 for lights—two plants to be installed as soon as bonds are sold and contracts closed.

Dallas, Tex.—City Commission has ordered special election to be held Jan. 6 to pass on \$500,000 bond issue to perfect waterworks system. The proceeds of the sale of bonds will be used to construct pipe line leading from reservoir to city, to erect large filtering plant and to build levee around Holly pumping plant.

Fort Worth, Tex.—City has been asked to call special election Jan. 6 to vote on \$500,000 bond issue for completing and remodeling waterworks system.

Temple, Tex.—Report recommending that electrical power be installed at city pumping station to replace steam power, was received and adopted Dec. 17 at meeting of water commissioners.

Wolfe City, Tex.—Bonds in the amount of \$4,400 were voted Dec. 21 to extend water works and to improve school system.

Centerville, Utah.—The proposal to bond city for \$15,000 to build water system was carried at election Dec. 22. Engineers are at work surveying lines and laying of pipe will be started soon.

Kamas, Utah.—At municipal election held Dec. 18 bond issue of \$15,000 for construction of a modern sanitary water plant was favorably voted.

Norfolk, Va.—T. B. Dornin, engineer in charge of water department, has completed three sets of plans and specifications for three dams in Little Creek and Lake Taylor. Bids will be received until Saturday, Jan. 8, by the Board of Control.

Olympia, Wash.—Olympia voted bonds Dec. 14 to purchase the Olympia water supply system and convert it into a municipal system. The bond issue totaled \$110,000.

Ridgefield, Wash.—Though an \$11,000 bond issue was voted and sold for city water system last fall, no definite steps have yet been taken to secure system. Tentative plans have been prepared but these, it is predicted, will be changed. Plan is to draw water from a well in city park and convey it to a reservoir.

southeast of town, where good pressure can be secured, and distribute it from there.

Sheboygan, Wis.—Council has appropriated \$45,000 from water works fund for 200 h. p. boiler and 12,000,000 gallon pump.

CONTRACTS AWARDED.

Frankfort, Ill.—For laying new mains in village and newly-annexed territory to Chicago Heights Coal Co. at \$10,919.24. J. M. Donahue, of Wisconsin, was the low bidder of \$10,918.54. Other bidders were: G. M. Gillight, \$11,814.46; Embankment Co., \$11,333.88; I. H. Englehardt, \$11,167.76; Curtis and Tindell, \$11,295.46; Gardner and Curtis, \$11,338.46.

Mishawaka, Ind.—By Board Public Works to Lynchburg Foundry Co., of Lynchburg, Va., for furnishing 475 tons of c. 1. water pipe at \$26.11 per ton and \$2.75 per lb. for fittings; total cost about \$13,000.

Atlantic City, N. J.—Ventnor Council's meeting was held Dec. 20 at Ventnor city hall and two contracts were awarded at session. Atlantic Construction Company was lowest bidder for proposed bulkhead to be erected in connection with waterworks extension. The Schweigert Company was awarded contract for building extension to waterworks, and will do job for \$30,000. This contract does not include necessary electrical equipment of addition to building.

Jersey City, N. J.—For installation of pipe line for water supply at county institutions, to Culligan & Machaska, Bayonne, N. J.

Brockville, N. Y.—By Public Utilities Commission for new filtration plant, o Roberts Filtration Co., of Darby, Pa., at \$86,000.

Yonkers, N. Y.—J. E. Fox & Company was awarded contract for supplying water department 1,000 lengths of eight-inch pipe and 500 length of six-inch pipe at meeting of board of contract and supply Dec. 20. Firm's bid was low at \$28.40 a ton.

Wilberforce, O.—For improving water works at the combined Normal and Industrial Department of Wilberforce University as follows: 8-in. well to Samuel H. Barnes, R. F. D. Dayton; water softening plant, Shartte Machinery Co., Columbus.

Galveston, Tex.—Contract to lay proposed submerged water main across Galveston Bay was awarded to Isaac Heffron for contract price of \$60,000 at special meeting of board of city commissioners Dec. 17. Under terms of proposition submitted by Mr. Heffron pipe is to be buried eight feet under bottom of bay so as to provide emergency main in case of accident to causeway main. Length of entire submerged main will be 9,108 feet.

MISCELLANEOUS

Miami, Ariz.—It was decided to abrogate the garbage contract of Garbage Contractor Smithson and new bids will accordingly be called for. However, Mr. Smithson will be allowed to continue in the work of collecting garbage until the end of the year 1915.

Tucson, Ariz.—The bid of Bent Bros., of Los Angeles, for \$66,700, was lowest of seven bids for construction of new subway under Espee tracks, submitted to City Council Dec. 18. The bids will be gone over by City Manager and City Engineer and contract let at next meeting of the Council. Other bids were as follows: T. Boettger, \$64,300; Missouri Valley Bridge & Iron Co., \$69,600; Charles H. Shaw & Co., 10 per cent of the cost; Mercereau Building & Construction Co., \$71,945; the Small & Triest Co., \$71,888; Warren Bros. Co., \$62,900. Estimated cost of work was \$70,000, to be borne equally by city and Espee Railroad Co. Subway is to start from end of Congress St.

San Diego, Cal.—Ocean Beach Improvement Club is considering plans for improving waterfront. Plans provide for twin jetties and a pleasure pier.

San Francisco, Cal.—Carstens & Earles, investment bankers of Seattle, have taken from R. C. Storrie & Co., Twin Peaks, tunnel contractors, \$2,300,000 of Twin Peak tunnel bonds.

San Francisco, Cal.—Ten bids for excavation and foundation work for northwest wind of San Francisco Hospital

were opened Dec. 15, lowest filed by O. Monson, amounting to \$15,637.

San Francisco, Cal.—City Treasurer McDougald Dec. 17 sold Hetch-Hetchy bonds to amount of \$12,000 to Masonic Home Endowment Fund, purchase being arranged by W. Filmer. He also delivered a \$40,000 block of Hetch-Hetchy to one buyer.

Yreka, Cal.—Butte Valley Land Co. of Macdoel, Siskiyou county, has contracted with Chapman & Co., contractors of Klamath Falls, Ore., to construct large ditch ten miles long, with laterals running entire length of its large holdings in Butte Creek Valley.

Jacksonville, Fla.—Bond issue of \$450,000 has been sold for harbor work and improvements.

Elgin, Ill.—Confidence of members of Kane County Board of Supervisors that \$1,500,000 bond issue will be carried at special election called for April 4, 1916, has led to the issuance of an order for the preparation of bonds.

Ottawa, Ill.—Two bids have been received for dredging out old feeder and opening new channel into Fox river. Bidders were George Sampson of Ottawa, \$2,120; M. C. Connors & Co., Chicago, \$2,140.

Indianapolis, Ind.—The west district park assessment roll, calling for expenditure of \$97,000 for parks next year, was approved recently by Indianapolis Park Board. Thirteen acres of ground on west side of White river between stream and levee, extending from Kentucky Ave. to River Ave., will be made into park land. Announcement was made to board that work would begin at once on a \$10,000 addition to greenhouse at Garfield park.

Onawa, Ia.—Petition for proposed \$100,000 drainage project in Soldier valley from Ute to the Harrison County line was filed with the County Supervisors. This does not only contemplate the straightening of the Soldier River, but will include necessary laterals.

New Orleans, La.—Hibernia Bank & Trust Co. was purchaser Saturday of an issue of \$50,000 Winn parish, Louisiana, Road District, 5 per cent bonds.

Baltimore, Md.—Board of Estimate will probably take up again in near future question of establishing municipal asphalt plant. Subject has been up several times but without definite action. It is now said that members of Board believe that not only can repairs to street paving be made more expeditiously from municipal plant but that work can be done more economically. Installation of such a plan would cost about \$20,000.

Fall River, Mass.—A loan for purchase of Warren St. site for playground purposes has been recommended by Aldermanic Committee on Finance. A further recommendation authorized raising of additional loan of \$65,000, within debt limit, to cover expenses in connection with remodeling of City Home on Bay St.

Flint, Mich.—Purchase of additional machinery by city to be used in construction work on pavements, sewers and grading next year was recommended to Common Council recently by City Engineer E. C. Shoecraft. The engineer called attention to fact that saving accomplished by use of machinery would more than pay for it in one year. The steel industry will in 1916 play a most important part in the cost and execution of all engineering work, he said, urging that purchase be made at once. An excavating machine for sewer work, another steam shovel and a crane for unloading gravel cars are principal items included in recommendation.

Gaylord, Minn.—Notice has been issued by Auditor Fred Hoppenstedt, by which Board of County Commissioners will consider plans and specifications for new county buildings to be built next year. County Board has limited the amount to be expended for new court house, sheriff's residence and jail to sum estimated not to exceed \$100,000 and plans are to be submitted by competing architects at January session.

Kansas City, Mo.—Kansas City's inadequate street light system is to be replaced with combination lamp posts and street signs if plans of joint committee of civic associations, formulated Dec. 20, are carried out.

Omaha, Neb.—City is discussing plans for garbage disposal.

Atlantic City, N. J.—Mayor Riddle an-

nounced Dec. 21 that proposed purchase of garbage plant by city with early elimination of nauseating odors as prime reason, would go through without any considerable opposition.

Plainfield, N. J.—Reported that city is discussing plans for purchase of motor patrol for police department.

Perth Amboy, N. J.—Council has approved plans for purchase of land for park purposes.

Perth Amboy, N. J.—A resolution has been passed authorizing clerk to advertise for collection of garbage, refuse and paper.

Roosevelt, N. J.—Bids will be received for \$18,500 bond issue until Dec. 29 at 8 o'clock at Fire House No. 2, Woodbridge Ave. Proceeds to be used for acquirement of land upon which to build public dock.

Brooklyn, N. Y.—Action on reconstruction of Brighton Beach elevated line and its connection with new Flatbush Ave. subway to Manhattan was taken Dec. 24 by Public Service Commission. First, Commission authorized Brooklyn Rapid Transit Co. to award contract for reconstruction of line from Church Ave. to Malbone St. to Intercontinental Construction Co. Four alternative methods of construction are permitted, the most expensive of which involved expenditure of \$1,014,170.60. Company is given 24 months to complete work. Second, Commission set Jan. 14 for opening of bids for construction of last link between new B. R. T. line under way on Flatbush Ave. and Brighton line at Malbone St. This is a city contract and is to comprise two tracks.

Canandaigua, N. Y.—City has voted \$16,000 to remodel town and city hall.

Raleigh, N. C.—The city of Raleigh sold Dec. 20 an issue of \$49,921.98 improvement bonds and \$26,916.52 assessment bonds for a total premium of \$2,942.91, the purchaser being Citizens National Bank of Frostburg, Md. There were 20 bidders, the second highest being C. T. McDonald of Raleigh, who offered a total premium of \$2,873.99.

Springfield, O.—Instead of waiting until after first of year as has been custom heretofore, bids will be called for and contracts for next year's municipal garbage collections and cement work awarded without delay, according to action taken last evening by City Commission. Under an increased appropriation, City Manager Ashburner informed Commission he expected to obtain better service in garbage collections next year, a total of \$4,500 being provided in budget of appropriations. This year's contract was awarded at a price of approximately \$2,900.

Youngstown, O.—Ordinance has been passed to accept plans submitted to village for proposed addition to city building.

Oregon City, Ore.—Municipal bonds amounting to \$275,000 were sold at private sale yesterday by city council to Lumbermens Trust Co. of Portland for par and accrued interest. An ordinance authorizing an issue of \$8,938 of improvement bonds has been approved.

Portland, Ore.—City improvement bonds amounting to \$97,000 were ordered sold by the Council Dec. 16.

Philadelphia, Pa.—City bonds valued at \$5,360,000 will be sold to highest bidders on Dec. 31 and proceeds used to replenish general loan balance in city treasury.

Wilkes-Barre, Pa.—An auction sale of \$32,400 worth of city improvement bonds was held Dec. 21 in the city hall.

Knoxville, Tenn.—Plans for election Jan. 29 to determine upon issuance of \$50,000 bonds for parks and playgrounds were discussed at meeting of directors of Junior Board of Commerce Dec. 15.

Portsmouth, Va.—Virginian Railway is reported to be planning an extension of 400 ft. to its large coal pier at Sewalls Point with view of increasing dumping capacity of road at its Hampton Roads terminal.

Kenosha, Wis.—Greiling Brothers of Green Bay were low bidders for work of putting in piling as protection for sewer along the river. Their price was \$1,803. Three bids were received by street assessment committee. Report of bids will be made to the Council Dec. 27 and it is expected that contract will be let at that time.

Madison, Wis.—Common Council voted Dec. 15 to issue \$30,000 bonds for installation of an incineration plant.

CONTRACTS AWARDED.

San Francisco, Cal.—Contract for construction of section of Church St. Municipal Railway, between 18th and 22nd Sts., was awarded yesterday by Board of Works to Contra Costa Construction Co. for \$120,500. Company can earn \$3,000 additional by speedy completion.

Fort Wayne, Ind.—On recommendation of Superintendent John Harkenrider Board of Works gave contracts for garbage collection to following: P. Kapley, Re-nald McKinley, S. J. Harshbarger, James Rowley, H. Berning, Amos Beatty and P. A. Parker, each of whom will operate one wagon. P. W. Vonderau and James Reilly were given the can wagon contracts.

Jersey City, N. J.—Members of board of freeholders at their meeting Dec. 20 awarded contract for building new county jail at Newark Ave. and Willow court to W. H. & F. W. Crane Co. at \$861,665, lowest price bid on No. 5 granite, which is known in trade as Concord granite.

Ogden, Utah.—The J. P. O'Neill Construction Co. of Ogden has been awarded contract for draining a large tract of waterlogged lands between Brigham City and Corinne, and will commence work shortly after Jan. 1. The Corinne Concrete Tile Co. will furnish the tile, and the cost of material, together with construction work, will bring cost to about \$160,000, according to Mr. O'Neill. His contract calls for approximate excavation of 50,000 cu. yds. of earth in digging canals, digging of 228.85 lin. miles of trenches, excavation of 8,000 cu. yds. of earth for foundations, manholes, etc.; laying about 228 miles of 4, 8 and 20-in. tile and installation of 400 joints of pipe. Work will be under direction and supervision of Corinne drainage district board of directors. This district has bonded itself for \$175,000 to complete work.

Salt Lake City, Utah.—To Parrott Bros., Baker, Ore., for first unit of dam for Parley's Canyon, at \$75,898.90.

Salt Lake City, Utah.—Contract for 18-in. c.-l. pipe line from Butler Ave.,

Federal Heights, to hydraulic laboratory of State University, to James Kennedy Construction Co.

Burlington, Vt.—Revised contract for collection of garbage in Burlington has been read and adopted. Difference between new contract and one which F. S. Hathaway agreed to last month is that term is for one year instead of three, that collections shall be made twice a week in winter instead of three times, which Dr. Sears stated was never carried out in previous contracts, and that garbage shall be collected in box wagons constructed of wood instead of lined with metal, which is considered more sanitary.

Janesville, Wis.—Council has voted \$700 for purchase of automobile police patrol.

Racine, Wis.—The street railway company has agreed to put in a concrete foundation under its tracks on the portion of Douglas Ave., which has not been improved and which is to be paved the coming summer.

TOO LATE FOR CLASSIFICATION

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS 'NQUIRIES TO
STREETS AND ROADS				
Tex., El Paso	6 p.m., Jan. 3..	Constructing concrete stadium, sidewalks and retaining walls	Trost & Trost, Mills Bldg.
N. Y., Brooklyn	11 a.m., Jan. 6..	Furnishing 40,000 asphalt paving blocks, 40,000 granite paving blocks, 40,000 wood paving blocks, 5,000 bbls. Portland cement and 2,000 cu. yds. paving sand	L. H. Pounds, Boro. Pres.
Minn., St. Paul	10.30 a.m., Jan. 10..	Grading and improving streets; 21 cars low grade non-asphaltic road oil and 60,000 gals. high grade asphaltic road oil	August Hohenstein, Pur. Agt.
Tex., Belton	10 a.m., Jan. 13..	Constructing gravel tarvia, Portland cement and asphaltic concrete pavement and concrete curb and gutter, cost \$15,000	W. E. Hall, Co. Aud.
Mo., St. Louis	noon, Jan. 14..	Sprinkling streets, 40 contracts	E. R. Kinsey, Pres. Bd. P. S.
SEWERAGE				
Ind., Washington	Jan. 3..	Dredging creek and improving land	County Commissioners.
Minn., St. Paul	10.30 a.m., Jan. 10..	Constructing sewer and furnishing material	August Hohenstein, Pur. Agt.
LIGHTING AND POWER				
Neb., Grand Island	noon, Jan. 1..	Lighting court house and jail	G. E. Neumann, Co. Clerk.
Minn., St. Paul	10.30 a.m., Jan. 10..	Furnishing and maintaining gasoline lamps in city	August Hohenstein, Pur. Agt.
Wis., Janesville	2 p.m., Jan. 11..	125 to 135 light standards	Bd. of Public Works.
FIRE EQUIPMENT.				
Tex., Wichita Falls	Jan. 7..	Furnishing motor ladder truck	J. L. McClure, Chief.
MISCELLANEOUS				
Minn., St. Paul	10.30 a.m., Jan. 10..	29 bbls. graphite paint, 3,475 cu. yds. crushed limestone and about 60 cars of crushed granite or trap rock	August Hohenstein, Pur. Agt.

STREETS AND ROADS

Birmingham, Ala.—Resolution was adopted Dec. 21 instructing city engineer to report route for an east and west highway through city of Birmingham.

Red Bluff, Cal.—A joint committee from Red Bluff, Chico and Los Molinos will meet with State Highway Commission in Sacramento in a final effort to induce Commission to sell highway bonds sufficient to build highway from Los Molinos to Butte County line. The Tehama County Supervisors have provided sufficient funds to pay premium necessary to sell the bonds.

Sacramento, Cal.—By an order of State Advisory Board, made Dec. 21 on application of the State Highway Commission, remaining bonds, \$1,500,000, of original \$18,000,000 issue are to be placed upon market and sold. This will close up all of bonds in hands of Highway Commission and when expended will complete work of the Highway Commission. It was announced recently that decision to sell these bonds at this time was due to good condition of the bond market. All of this money will be used in winding up affairs of the Commission and destroys any hopes of counties that they will be able to purchase any additional bonds for desired highway construction.

San Diego, Cal.—Before paving of Prospect St., La Jolla, is ordered Council will investigate merits of bitulithic

paving, known as Warrenite, manufactured by Warren Brothers, of Buffalo, N. Y.

San Francisco, Cal.—City Engineer's plans and specifications for affording easy access to hill at Sanchez and Cumberland Sts. were approved Dec. 19 by Board of Works and bids will be invited. Cost of work is estimated at \$35,000.

Lewiston, Ida.—Lewiston highway district Dec. 20 voted bonds to amount of \$150,000 to provide for construction of hard surface highway from Clearwater river to top of Uniontown hill. The road, from a point near Uniontown to south bank of the Snake river in Clarks-town, constitutes Idaho link in Washington state highway system.

Council Bluffs, Ia.—Estimates of city engineer place cost of paving Ave. A for 2.3 miles, from 14th St. to 37th St. at \$119,780.55, figuring paving at \$1.55 a yard, curbing at 70 cts. a lin. ft. and grading at 50 cts. a yd. Of this sum street car company would pay \$27,931, city and property owners \$53,780.35, and curbing totals \$17,062.20. Grading to bring street to level amounts to an estimate of 41,594 yds., costing \$20,797. No action was taken by Council relative to project and it probably will be brought up at meeting early in new year.

Pittsburg, Kan.—City has ordered following improvements on Chestnut St.: Curbing and guttering of Chestnut St. from south line of Kansas Ave. to north line of Forest Ave. with concrete curb

and guttering, and grading and paving with vitrified brick on a 4-in. concrete base or a double course of brick pavement, or a 6-in. concrete pavement, or an asphaltic pavement, or a 2-in. National pavement on a 4-in. concrete base, so as to make the driveway of said street 24 ft. wide from curb to curb.

Topeka, Kan.—Commissioners have ordered improvements on following streets: Ninth St. from west line of Madison St. to east line of Monroe St. to be graded and curbed with combined curb and gutter, and paved 30 ft. wide, with 20 per cent vitrified blocks on a 5-in. concrete base with asphalt filler. Garfield Ave. from north line of 10th Ave. to south line of 8th Ave. to be graded and curbed with combined curb and gutter, and paved 26 ft. wide, with asphaltic concrete, on a 5-in. concrete base. Eleventh St. from west line of Lane St. to east line of West St. to be graded and curbed with combined curb and gutter, and paved 26 ft. wide, with asphaltic concrete on a 5-in. concrete base. Fifth St. from west line of Buchanan St. to east line of Lincoln St. to be graded and curbed with combined curb and gutter, and paved 30 ft. wide, with asphaltic concrete on a 5-in. concrete base.

Port Huron, Mich.—State Highway Commissioner Rogers and county road officials Dec. 23 met a delegation of Algonac citizens and selected route for the trunk line highway which is to include Algonac. The new route will run

MUNICIPAL JOURNAL

50 UNION SQUARE, NEW YORK

VOLUME XXXIX
No. 27

DECEMBER 30, 1915

\$3.00 a year
10 cents a copy

Here's the Solution of Your Old Macadam Roads

Surface Them With

BITULITHIC

Bitulithic surface has been used to a great extent for surfacing macadam roads in a number of cities with most gratifying results.

Bitulithic surface can be laid on old macadam and give entire satisfaction.

It is false economy to keep repairing your old macadam roads when by using the old macadam, the usefulness of which as a road for travel has past, as a foundation for the Bitulithic pavement you save the expense of laying a new concrete foundation and stop the large maintenance cost you now expend yearly.

It is cheaper to have a good, substantial bituminous surface in the beginning than to have cheap, inferior construction which has to be repaired within a year or two after it is laid.

Many cities have found this out and over 340 cities throughout the United States and Canada have adopted Bitulithic as the standard pavement for their streets.

Let us give you the benefit of our many years' experience in the street paving industry.



Bitulithic Pavement Beacon St. (North Drive), Brookline, Mass. Laid over Old Macadam

BITULITHIC ONCE — BITULITHIC ALWAYS

It is the pavement you are looking for.

Why Not Build for All Time When It Costs Very Little More?

Specify Bitulithic

Write today for illustrated booklets

WARREN BROTHERS COMPANY

EXECUTIVE OFFICES: BOSTON, MASS.

NEW YORK, N. Y.
50 Church St.
PHOENIX, ARIZ.
204 Noll Bldg.

CHICAGO, ILL.
10 So. La Salle St.
RICHMOND, VA.
Virginia Railway & Power Bldg.

DISTRICT OFFICES:

ROCHESTER, N. Y.
303 Main St. West

LOS ANGELES, CAL.
926 Calif. Bldg.

NASHVILLE, TENN.
Independent Life Bldg.

PORTLAND, OREGON
Journal Bldg.
ST. LOUIS, MO.
Railway Exchange Bldg.

GLUTRIN ROAD-BINDER



GLUTRIN
REG. U. S. PAT. OFF.

Glutrin (a liquid, but not an oil nor a tar) is, beyond question, the best binder for the improvement and preservation of gravel and sand-clay roads. To bind such roads with glutrin means low initial cost, efficient service, and very low maintenance.

Robeson Process Company

General Offices
18 East 41st Street, New York City

**AZTEC
ASPHALT**

THE UNITED STATES ASPHALT REFINING COMPANY

90 West Street, New York

Chicago

Boston

Montreal

Norfolk

Philadelphia

CUMMER

Plants in stock.

THE F. D. CUMMER & SON CO., CLEVELAND, O.

ONE-CAR ASPHALT PLANT

STEAM MELTING

2000 sq. yds. 2" Top, Macadam or Topeka Mix Daily.

DIRECT HEAT MELTING

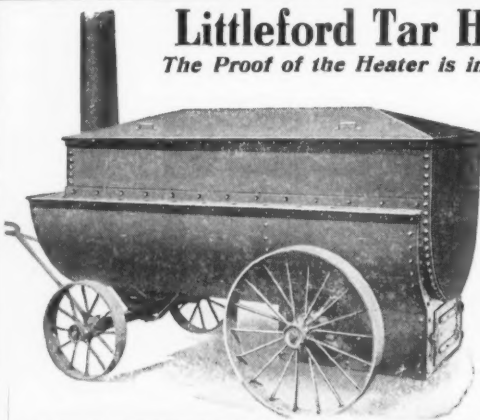
ROAD ASPHALT PLANT (on wheels) easily moved

Two sizes—750 and 1250 sq. yds. 2" Top, Macadam or Topeka Mix Daily

Best references.

Littleford Tar Heaters

The Proof of the Heater is in the Heating



Built in
sizes ranging
from 50 to
900 gal.

Especially
adapted for
road and
street con-
struction
and main-
tenance work

Write for
Catalog.

LITTLEFORD BROS., 451 East Pearl Street, Cincinnati, Ohio

J-M MUNICIPAL SUPPLIES

Asbestos goods of every description J-M Underground Conduit
J-M Asbestos Roofing J-M Fibre Conduit
J-M Transite Asbestos Shingles J-M Electrical Supplies
J-M Pipe and Boiler Coverings J-M Asbestos Fireproofing Materials
J-M Asbestos Packings (for every purpose) WRITE FOR CATALOG J-M Fireproof Moving Picture Machine Booths
H: W. JOHNS-MANVILLE CO., New York —and Every Large City

WHEN YOU WRITE ADVERTISERS YOU WILL
DO THEM AND US A FAVOR BY MENTIONING

MUNICIPAL JOURNAL

PAVING BRICK



"Best Paving Block Made"

THE METROPOLITAN PAVING BRICK CO.
CANTON, OHIO



Porter-National Paving Block

Most uniform Fire Clay Paving Blocks made.
First streets laid with Fire Clay Paving Brick in United States in year 1883 made and sold by Capt. John Porter, who is still in business with this firm.

Capacity over 15,000,000 annually

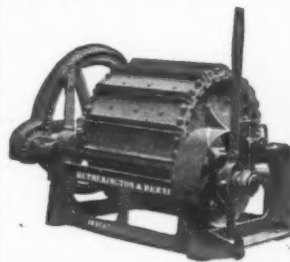
Samples furnished and prices submitted to all responsible parties.

Works at New Cumberland, W. Va.—P. O., East Liverpool, Ohio
Pittsburgh Office—506 Diamond Bank Building

GLOBE BRICK COMPANY
EAST LIVERPOOL, OHIO

Be absolutely certain that your Paving Brick conform to Standard Specifications.

N. P. B. M. Standard Rattler



For the Testing of Paving Brick

The H & B
Paving Brick
Testing Machine

is constructed exactly to the specifications of the National Paving Brick Manufacturers' Association. Will save its initial cost to any municipality or contractor within a short time.

For descriptive circular and prices address

HETHERINGTON & BERNER
INDIANAPOLIS, INDIANA

Specify BESSEMER BLOCK

"The Block With the Wear Burned In"

LARGE CAPACITY. PROMPT DELIVERIES.

WIRE-CUT-LUG OR REPPRESSED

BESSEMER LIMESTONE CO., YOUNGSTOWN, OHIO

MILTON RED SHALE PAVING SIDEWALK BLOCKS

Plain Face and Rough Texture Building Brick
Water and Acid Proof
Factory and Sewer Brick

N. Y. Office
47 W. 34th St.
Room 704

MILTON BRICK CO.
Works—Milton, Pa. 803 Franklin Bank Building Phila. Office

PATERSON
Clay Products Co.
Clearfield, Pa.
Paving Blocks



*Highest Quality
Moderate Prices
Prompt Shipments*

are what you get when you buy

"Clearfield" or "Standard" Pavers

Clearfield Brick Mfg. Co.
Clearfield, Pa.

In competitive tests, or in the test of actual, continual service over a long period, the big winners are

**MACK VITRIFIED
PAVING BLOCKS**

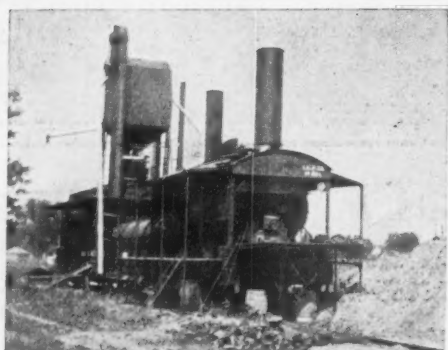
for a quarter of a century the standard paving material in America.

Capacity 300,000 a day.

MACK MANUFACTURING CO.

General Offices, New Cumberland W. Va.
Eastern Office, 1008 Lincoln Bldg., Philadelphia, Pa.
Pittsburgh Office, 807 Arrol Bldg

For Information OR BOOKS RELATING TO MUNICIPAL MATTERS, WRITE **Municipal Journal**



**MUNICIPAL
STATIONARY
PORTABLE &
RAILROAD**

**ASPHALT
PLANTS**

THE BEST OUTFITS AND BEST PRICES
WE BUILD THEM OURSELVES

HETHERINGTON & BERNER
INDIANAPOLIS, INDIANA, U. S. A.

Established 1881.
WYCKOFF
WOOD PAVING BLOCKS
NEVER BUCKLE NOR DECAY

Manufacturers of Wyckoff Conduit for Underground Wires, Railroad Ties, Piles, Poles, Bridge Timbers, Cross Arms, Wood Pipe, Steam Pipe Casings. Send for Catalogue D.

**PIPE AND
CREOSOTING
COMPANY**

30 East 42nd St. New York

**GENERAL
CREOSOTERS**

CREOSOTED

WOOD BLOCK PAVING, BRIDGE TIMBERS
TIES, POLES, PILING, CROSS-ARMS, CONDUIT

Also Ties Treated with Zinc Chloride.

Pittsburgh Wood Preserving Co.

The Ohio Wood Preserving Co.

Michigan Wood Preserving Co.

Office
Commonwealth Building
Pittsburgh, Pa.

Plants { Pittsburgh, Pa.
Orrville, Ohio
Reed City, Mich.

**MERRIMAN
ASPHALT
PLANTS**

**The PIONEER of portable railroad Steam MELTING
one-car Asphalt Plants**

2,800 sq. yds. 2" Sheet Top in 10 hours actually demonstrated.

Steam Melting Road Plant, One or Two Units, 750 sq. yds

Quick Delivery

THE EAST IRON & MACHINE COMPANY, Lima, Ohio

Ask our customers.

BUFFALO PITTS ROLLERS

Macadam Rollers
Tandem Rollers
Asphalt Rollers

Embankment Rollers
Combination Rollers
Road Scarifiers

SEND FOR CATALOG

BUFFALO STEAM ROLLER CO.,
Buffalo, N. Y.

ASK THE MAN WHO HAS ONE

Our hundreds of satisfied customers are convincing
proof of the reliability of the

COOL RUNNING RELIANCE CRUSHER

Universal Road Machinery Co., Kingston, N. Y.

BOSTON

ROCHESTER

NEW YORK

PROPOSAL ADVERTISING

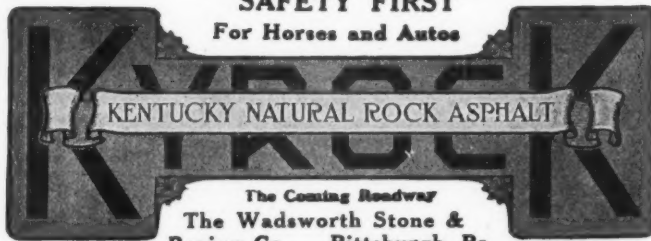
Municipal officials will serve their constituents well by
seeing that PROPOSALS FOR MUNICIPAL IM-
PROVEMENTS of all kinds are inserted in

MUNICIPAL JOURNAL

Publication Office, 50 Union Square, NEW YORK

SAFETY FIRST

For Horses and Autos



The Coming Roadway
The Wadsworth Stone &
Paving Co. Pittsburgh, Pa.

Asphalt Plant

ONE CAR RAILROAD TYPE.
Capacity 1200 yards top. New—
never been used.

For Sale on Reasonable Terms

or will rent to responsible con-
tractor or to municipality, with
option to purchase.

Address, Box 9A, **MUNICIPAL JOURNAL.**

Proposal Advertising

Municipal officials will serve their
constituents well by seeing that
PROPOSALS FOR MUNICIPAL
IMPROVEMENTS of all kinds
are inserted in

MUNICIPAL JOURNAL

Publication Office, 50 Union Square, New York



The Modern Flusher For Progressive Municipalities

Efficient flushing and sprinkling apparatus mounted on GMC chassis is now being used by many cities and towns both in the United States and Canada. We are in a position to give facts and figures regarding horse-drawn flushers and motor-driven flushers. We can also supply data regarding trucks for garbage removal, police patrols, ambulances, supply department work, public lighting service and maintenance, fire fighting, etc., etc.

Our technical department will be pleased to answer questions regarding special equipment or send you a copy of "Municipal Progress."

GENERAL MOTORS TRUCK CO

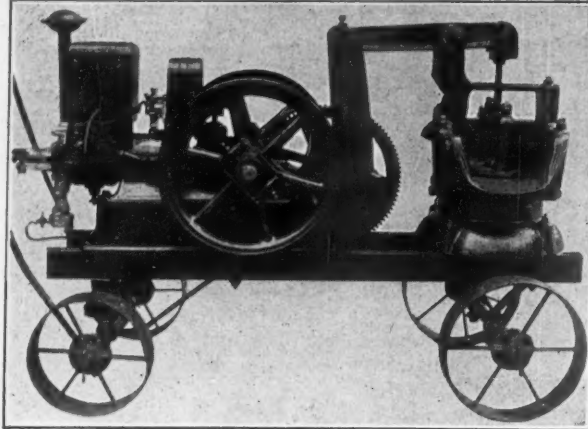
One of the Units of General Motors Company

PONTIAC, MICH.

*Direct Factory Branches: New York, Boston, Chicago, Philadelphia,
St. Louis, Kansas City*

(54)





TARCO Single and Double Diaphragm **TRENCH PUMP**

Capacity of Double Pump 7,500 to 8,000 gallons per hour. Single Pump, 3,500 to 3,800.

NO BATTERIES are used. It is equipped with 1 3/4 H.P. Water Cooled Gasoline Engine and direct geared oil and waterproof Magneto.

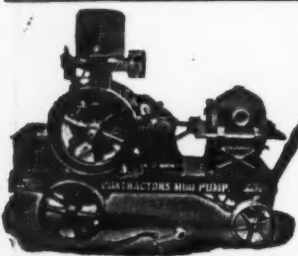
Our engine will operate under severe conditions that would be impossible with those using batteries.

Buy a Tarco and do the work of 8 or 10 laborers at a cost of 50 to 75 cents a day. For prices and terms, write

TARRANT MANUFACTURING CO.
Saratoga Springs, N. Y.

WHEN YOU WRITE ADVERTISERS YOU WILL
DO THEM AND US A FAVOR BY MENTIONING

MUNICIPAL JOURNAL



90% Saving in Pump Operating Cost if you use The Parker Contractor's Mud Pump

It has double the capacity of the hand-power pump and can be operated at one-tenth the cost. It will raise and force from 6000 to 8000 gallons of water per hour on less than one quart of gasoline. The truck is solid, is easily transported around the job.

Let us tell you more in our Booklet.

A. A. PARKER, Waterford, N. Y., Sole Manufacturer
NEW ENGLAND AGENTS: Perrin, Seamans & Co., 57 Oliver Street, Boston, Mass.



Felton's Improved Couplings for Conduit and Sewer Rods

Quickly coupled and uncoupled.
Cannot separate while in use.
Turned in either direction without unlocking.
Send for circular and prices

MANUFACTURED BY

HAROLD L. BOND CO.

DEALERS IN TOOLS AND MACHINERY FOR ALL
FORMS OF CONSTRUCTION WORK

833 Atlantic Avenue, Boston, Mass.

Advertise Your Call for Bids in **Municipal Journal** THE BEST—THE DIRECT MEDIUM

It is the only weekly publication devoted EXCLUSIVELY to municipal and other public work.

Contractors who specialize in this field and know how to do such work best DEPEND upon MUNICIPAL JOURNAL for Advance News—Address 50 Union Square, New York.

A ON

UNDER ONE MANAGEMENT



THE STRATTON FIRE CLAY CO.

THE GREAT NORTHERN SEWER PIPE CO.

THE OHIO RIVER SEWER PIPE CO.

Manufacturers of ALL CLAY PRODUCTS.

EMPIRE, JEFFERSON COUNTY, OHIO

Not Identified With Any Trust

Practical Books on Sewerage and Sanitation

forming a complete library of standard works by experts on
sewerage, sewage disposal, sewer construction and sanitation

SEWAGE DISPOSAL. By George W. Fuller. A complete text-book dealing particularly with American practice.

SEWAGE. By Samuel Rideal, D. Sc. Contains an excellent theoretical discussion of bacterial processes.

SEWAGE DISPOSAL. By L. P. Kinnicutt, C. E. A. Winslow and R. N. Pratt. Emphasizes the chemical and bacteriological aspects.

SEWER CONSTRUCTION. By Henry N. Ogden, C. E. A good work for students and practicing engineers, giving cost data.

SEWERAGE. By A. P. Folwell. An authoritative book on the design, construction and maintenance of all types of sewerage systems.

CONSERVATION BY SANITATION. By Ellen H. Richards. Deals with air and water supply and waste disposal (with a laboratory guide).

SANITATION AND SANITARY ENGINEERING. By W. P. Gerhard, C. E. An interesting general discussion.

Order from **MUNICIPAL JOURNAL**

50 UNION SQUARE, NEW YORK

Economy Flushing Nozzles can be lowered or raised by operating lever! Volume is such that all dirt and refuse is carried down the gutter! Get an Economy Street Flusher!!

The Economy is simple and easy to operate—will not get out of order—and will last a lifetime. Send for particulars.

O'NEIL IMPLEMENT CO., Marseilles, Ill.



SANITARY STREET FLUSHING MACHINE CO.

MANUFACTURERS

CARLETON BUILDING

ST. LOUIS, U.S.A.



Is it any wonder that American-La France Pumpers enjoy a large sale?

Chief J. W. Graham of
Ottawa, Canada, says of his
two American-La France
Pumping Cars:—

"The Pumpers are working splendidly, they run like sewing machines. We have not had the slightest trouble and everyone who has anything to do with these cars becomes enthusiastic over them."

AMERICAN-LA FRANCE FIRE ENGINE COMPANY, INC.

ELMIRA, N. Y.

Members of National Automobile Chamber of Commerce
Licensed under the Dyer patents.

MUNICIPAL LIFE AND GOVERNMENT IN GERMANY

By

WILLIAM HARBUTT DAWSON

Good municipal methods were "made in Germany." To any city official who wants to know what efficiency can do for a city and exactly how the Germans have applied efficiency methods to every branch of municipal government, this book is a practical guide.

The chapters on administration, finance, taxation, municipal trading, planning, housing and public health, particularly, tell how and why. There is no American city which could not profit by some of the information in this volume.

500 pp., \$3.75 net

Order from

MUNICIPAL JOURNAL

50 Union Square

New York

HOTEL CUMBERLAND

NEW YORK

Southwest Corner Broadway at Fifty-fourth Street

Near 50th Street Subway Station and 53d Street Elevated. "Broadway" Cars from Grand Central Depot; Seventh Avenue Cars from Pennsylvania Station.



**Headquarters for
Municipal Officials
Engineers and
Contractors**

**New and Fireproof
Strictly First-class
Rates Reasonable**

**All Hardwood Floors and
Oriental Rugs**

10 Minutes' Walk to Forty Theatres

Transient Rates **\$2.50** with Bath and up
Excellent Restaurant. Prices Moderate
Only New York Hotel window-screened throughout

Send for Booklet

HARRY P. STIMSON, Formerly with Hotel Imperial

A NEW BOOK**The Operation of
Sewage Disposal Plants****By FRANCIS E. DANIELS, A. M.**

No other man in the United States has had so good an opportunity of studying the Sewage Disposal Plants in Operation. As State Inspector for New Jersey, Mr. Daniels has examined and made notes in detail on 66 plants, embracing practically every type that is in actual use.

To those in charge of Sewage Disposal Plants in Operation, this volume will show how the best results can be obtained. Designing engineers will find it valuable because it shows failures and successes due frequently to faulty or good designs and construction.

It is commended universally to Consulting Engineers, City Engineers, Boards of Health, and those in charge of going plants.

Price \$1.50 postpaid

**MUNICIPAL JOURNAL***Publishers***50 Union Square****NEW YORK CITY**

The far-reaching tones of New Departure Fire Bells

rise clear and distinct above the din of traffic

"FIRE" is the first thought of all who hear them. The public never stop to see what's coming. They know.

They get out of the way.

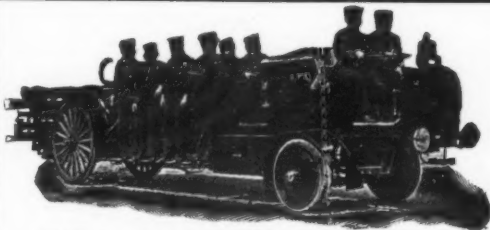
The road is cleared, instantly, instinctively.

No other alarm will do this.

New Departure Fire Bells are used on apparatus in the largest cities, in the smallest towns.

Send for our new complete catalog.

THE NEW DEPARTURE MFG. CO., BRISTOL, CONN., U. S. A.



Save
25%
to
50%

Motorize Your Horse Drawn Apparatus With Couple Gear

No need of discarding good horse drawn equipment—you can easily and quickly convert it to motor with Couple Gear.

Write for complete information before you decide on new apparatus

COUPLE GEAR FREIGHT WHEEL COMPANY
485 Buchanan Avenue, Grand Rapids, Mich.

Philadelphia Agency: Municipal Equipment Co., 522 Weightman Bldg.



EUREKA FIRE HOSE

Made of the highest grade fabrics in three or more plies (each ply a hose in itself) and woven in a continuous circular form (not flat). It is exceedingly strong, light and durable.

Eureka Fire Hose Mfg. Co., New York

COTTON RUBBER LINED FIRE HOSE

Wax and Para Gum Treated

MILDEW AND ROT PROOF

FABRIC FIRE HOSE MANUFACTURING CO.

Cor. Duane and Church Streets

NEW YORK

Announcement 1916

On and after January 1st, 1916, our Standard Specifications for all types of Fire Apparatus will include "Worm Drive," which is a positive guarantee of effective service under the most difficult conditions.

The acknowledged superiority of the Worm Drive leaves no room for discussion, and we are proud to be the pioneer with it in

MOTOR DRIVEN FIRE APPARATUS

James Boyd & Brother, Inc.

"Builders of the Best"

Philadelphia, Pennsylvania

TOWN PLANNING

By

George Cadbury, Jr.

Describes and explains clearly the steps to be taken in the actual preparation of a city plan. Complete and authoritative but not technical. A real help to all interested in city planning.

Price, \$2.25 net

Order from

Municipal Journal, 50 Union Sq., New York

GAMEWELL

Not a Name Only—
But



57 Years a Standard
For

Trade Mark, Registered. U. S. Patent Office.

FIRE ALARM POLICE TELEGRAPH

No apparatus has ever been shown for Municipal Telegraph Systems that was not either an Imitation of Gamewell Standards or patterned after methods discarded by our engineers.

While "Imitation is the sincerest of flattery," yet when used to protect life and property it is dangerous.

"SAFETY FIRST"

AGENCIES

445 John Hancock Building, Boston, Mass.

1216 Lytton Bldg., Chicago, Ill.

335 Wabash Bldg., Pittsburgh, Pa.

1006 Aronson Building, San Francisco, Cal.

304 Central Bldg., Seattle, Wash.

Utica Fire Alarm Tel. Co., Utica, N. Y.

Northern Electric Co., Ltd., Montreal, Can.

General Fire Appliances Co., Ltd., Johannesburg, S. Af.

Colonial Trading Co., Ancon, Canal Zone, Panama.

F. F. Danforth, 1060 Calle Rioja, Rosario de Santa Fe, Argentine Republic.

Trajano de Medeiros & Co., Rio de Janeiro, Brazil.

C. Lorenz Co., Berlin, Germany.

GENERAL SALES AND EXECUTIVE OFFICE, 5706 GRAND CENTRAL TERMINAL, NEW YORK CITY

THE GAMEWELL FIRE ALARM TELEGRAPH CO.

General Offices and Works
NEWTON UPPER FALLS, MASS.

STANDARD

Refined
Mexican Asphalt

Prepared in various grades for

Sheet Asphalt Pavements
and
Bituminous Macadam Road Construction

by either the penetration or mixing method.

Standard Asphalt Block Filler

Standard Asphalt Road Oil

Standard Bridge Asphalt and Standard
Preserving Oil

Specifications, etc., on application.

STANDARD OIL CO. OF NEW YORK

Road Oil Department

26 Broadway

New York



QUALITY

PIONEER PAINTS
PIONEER ROAD ASPHALTS
PIONEER PAVING CEMENTS
PIONEER WATERPROOFINGS
PIONEER FILLER ASPHALTS
PIONEER EXPANSION JOINT COMPOUNDS

"PIONEER"

Whenever you have occasion to use asphalt or special bituminous materials, kindly bear us in mind.

Our Policy — A personal interest in every order—an earnest endeavor to please.

The Pioneer Asphalt Co.

LAWRENCEVILLE,
ILL.

FIRST

The Austin-Western Line of Road and Street Machinery

Tandem and Macadam Rollers
Street Sweepers and Sprinklers
Scarifiers and Road Oilers
Jaw and Gyratory Rock Crushers
Dump and Spreader Wagons
Road and Elevating Graders
Drag and Wheeled Scrapers

The Austin-Western Road
Machinery Company

CHICAGO

Direct representatives in every State



Rebuilding Old Roads Each Spring Costs More Than New Concrete Roads

Your road taxes should go into permanent construction instead of being wasted year after year in expensive upkeep.

The old-fashioned Macadam road 16 feet wide costs approximately \$10,000.00 per mile and must be practically rebuilt every few years.

The concrete road of the same size costs approximately \$13,000.00 per mile and lasts indefinitely.

Property values increase. That's why your choice should be a concrete road made of

LEHIGH
CEMENT

Asphaltic Road Binders and Dust Preventives.

BICOMAC.

H. G. R. No. 1

Headley Good Roads Company

Thirtieth and Spruce Streets

Philadelphia, Pa.



SANITARY CARTS

(Patented)
for Garbage, Night Soil,
Materials from Sewers,
Inlets, Etc.

Made for 1 or 2 horses
2 or 4 Wheel

Write for Catalogue
Geo. H. Holzbog & Bro.
Jeffersonville, Indiana

BUFF

ENGINEERING INSTRUMENTS

The engineer who glories in doing accurate work,
enthusiasts about "BUFF" Instruments—they are
first aid to accurate work. Write for Catalog 39.

BUFF & BUFF COMPANY
Jamaica Plain Station, Boston, Mass.
Chicago: 1742 Monadnock Bldg.



Inquiries already received indicate that the demand for Road Oils for 1916 will be unprecedented.



If you are contemplating the initial, or continued use of Road Oil in 1916, we suggest the matter of the securing of your supply be given your early attention.

We are now prepared to furnish specifications and other information which you may desire on INDIAN ROAD OILS for 1916 delivery.

INDIAN REFINING CO., Inc.

Road and Fuel Oil Department

NEW YORK, N. Y.

THE BEST BOOKS ON CITY GOVERNMENT

By the Most Competent Authorities. Read Them and Keep Up With Modern Progress.

LOOSE LEAF DIGEST OF SHORT BALLOT CHARTERS.—

The Final Authority. Kept up-to-the-minute by the loose leaf plan. Contains a digest of state legislation, texts of significant charters, comparisons, numerous expert articles and bibliography. **Price, \$5.00 net.**

CHARLES A. BEARD

Columbia University

THE NEW CITY GOVERNMENT.—

The Municipal Administration of Ten Commission Cities. Constructive suggestions on all municipal departments based on knowledge of ten years' actual operation. **Price, \$1.50 net.**

HENRY BRUERE

Director, New York Bureau
of Municipal Research

HANDBOOK OF MUNICIPAL ACCOUNTING.—

The only work so far available showing how. A simple exposition of a scientific system of accounting and reporting for municipal utilities. Accurate, complete, prompt information. **Price, \$2.00 net.**

**BUREAU OF MUNI-
CIPAL RESEARCH**

MODERN CITIES.—A painstaking study of conditions of city government here and in Europe by two competent investigators. **Price, \$1.50 net.**

Horatio M. Pollock, Ph.D.

and

William S. Morgan, Ph.D.

ORDER FROM

Municipal Journal, 50 Union Square, New York

PROPOSALS

OFFICE OF TOWN ENGINEER
WESTFIELD, MASS.

NOTICE TO CONTRACTORS

Scaled bids for furnishing Sewer Pipe will be received by the Board of Selectmen of the Town of Westfield, Massachusetts, at the office of the Town Clerk, Town Hall, until 11 o'clock A. M., January 6, 1916, and at that time will be publicly opened and read.

Each bid must be accompanied by a properly certified check for two hundred (200) dollars.

About 10,000 lin. ft. of pipe, sizes 6" to 24" will be required.

Blank forms of proposal and specifications may be obtained at the office of the Town Engineer, Town Hall, Westfield, Mass.

The Selectmen reserve the right to reject any and all bids should they deem it advisable to do so, and reserve the right to award the contract as they deem best.

PERCY N. HALL,
CHARLES L. HOUGHTON,
LOUIS M. FULLER,

Board of Selectmen.

JOHN L. HYDE, Town Engineer.

TREASURY DEPARTMENT. Supervising Architect's Office, Washington, D. C., December 16, 1915.—Scaled proposals will be opened in this office at 3 p. m., January 27, 1916, for the construction complete (including mechanical equipment and approaches) of the United States post office at Ellensburg, Wash. Drawings and specifications may be obtained from the custodian of site at Ellensburg, Wash., or at this office, in the discretion of the Supervising Architect. Jas. A. Wetmore, Acting Supervising Architect.

FOR SALE

One "OO" Austin Trenching Machine with ten-foot extension, nearly new. Address J. E. Poin-dexter, Receiver, Fayetteville, Tennessee.

FOR SALE CHEAP

Wrought Pipe, second hand, all sizes, recut and rethreaded suitable for all classes of work. Prices quoted on application.

MARINE METAL & SUPPLY CO
167 South Street, New York City

POSITION WANTED

Position as City Engineer or City Manager by Municipal Engineer with eight years' experience as City Engineer and Commissioner of Streets in thriving city of 11,000 population. 27 years of age. Can furnish best of references. Address Box 26A, Municipal Journal.

from Perch Point to Pearl Beach and then to Algonac. It is proposed to have boulevard between Algonac and Pearl Beach and Rapid railway is co-operating in work. Route of Rapid railway will also be changed as a result of adoption of new route and double track will be laid from Perch Point to Algonac by way of Pearl Beach. Considerable dredging is necessary along the river front to make roadway and Lakeside Dredging Co. of Detroit will probably do work, which will be begun next week.

Saginaw, Mich.—A frontage majority of property owners on South Washington, between Janes and Johnson, favors asphalt for paving improvement to be done in 1916, decision being given at conference Dec. 21 at city hall. Approval of general proposition of improvement was first given, and then question of material was taken up, verdict being for asphalt, with present pavement as base.

Hibbing, Minn.—At the last meeting of the town board of Stuntz, a petition was received from residents of township asking for road starting at southeast corner of section 36, 57-20, and thence south six miles to the town line between 56 and 55, thence east four miles. The town engineer has just completed survey and it is thought possible that the board will act favorably on a motion to start work shortly. Kleffman road survey has also been made by Engineer Stevens. The road now runs as far south as Day lake, but the many settlers located in that country want it extended further.

Schenectady, N. Y.—Resolution was introduced Dec. 24 by Supervisor Wilsey for construction of water bound macadam highway in town of Greenfield, a distance of 4.75 miles, at estimated cost of \$13,152. Supervisor Smead offered resolution authorizing town of Hadley to construct water bound macadam highway from Hadley to town line of Day, a distance of six miles, at estimated cost of \$27,547.

Syracuse, N. Y.—Work will commence as soon as weather conditions permit on three contracts awarded Mondo Construction Co. by Board of Contract and Supply for municipal improvements. Largest of three jobs calls for construction of a 5-ft. cement sidewalk on both sides of Spencer St. from North Clinton and Sand Sts. Spencer St. was recently opened and this is part of the development work planned at that time. The price is \$2,619. Two streets in southwest section of city will be improved by virtue of grading contracts. One thousand five hundred and ninety-six dollars was price agreed upon for grading work in Crossett St. between Beverley Rd. and South Geddes St. For grading of Barry St. between Onondaga Ave. and Haywood St. \$600 was allowed.

Syracuse, N. Y.—Mondo Co. bid on job up for consideration at recent meeting, but bid was rejected because of disagreement over materials to be used. The intersection of 3d, North and Court Sts. was to be paved and the Mondo Co., low bidder, offered a price of \$2,375. Bids will be readvertised with a change in specifications.

Belton, Tex.—County Commissioners Dec. 22 passed an order instructing County Auditor W. E. Hall to advertise for bids on paving to be done on streets of Rogers as a part of road district No. 10. Commissioners' Court also arranged for connecting up of several sections of graveled roads which have been built in different sections of county.

Dallas, Tex.—Paving of Young St. from Houston to Akard and of Wood St. from Houston to and including intersection of Jefferson will be ordered. Work will be done under regular paving plan, city paying one-third of cost. Improvement is estimated to cost \$40,000. It will complete paving of area around new Union Depot.

CONTRACTS AWARDED.

Norfolk, Va.—Board of Control Dec. 24 approved recommendation of city engineer for award of contract to Louis Lawson for sheet asphalt on 19th St., eastward from Colonial Ave.

Olympia, Wash.—General Construction Co. of Spokane was awarded contract for grading of 9 miles between Rosalia and Oakesdale on Sunset highway by Highway Board Dec. 20. Contract price was \$121,646. S. G. Kinder of Bridgeport was successful bidder for the 12 miles of graveling between Wenatchee and Orondo on Inland Empire highway. His bid of \$7,563 was lowest offer submitted. There were seven bidders for Rosalia job.

Olympia, Wash.—State Highway Commission Dec. 20 awarded \$100,000 worth of state highway contracts for Eastern Washington work to be started as soon as weather conditions permit next year. Awards were as follows: Inland Empire highway, Pullman south, 9 miles, construction, G. L. Stickler, Davenport, \$23,887.30; Inland Empire highway, Rosalia-Oakesdale, 9 miles, construction, General Construction Co., Spokane, \$21,646.45; Inland Empire highway, Touchet-Wallula, 9½ miles, construction, G. L. Stickler, Davenport, \$22,639; Inland Empire highway, Kiona-Richland, 12 miles, construction, H. L. Wilson Co., Walla Walla, \$16,945.85; Sunset highway, Wenatchee-Orondo, 11 miles, gravel surfacing, S. G. Kinder, Bridgeport, \$7,568.50.

Seattle, Wash.—At special meeting of Board of Public Works Dec. 21 contract for planking on Rainier Ave., L. I. D.

No. 2695, was awarded to J. B. Romano on a bid of \$9,507.66.

Tacoma, Wash.—Contract to grade and lay sidewalks on South G St. from 45th to 46th Sts. was awarded Dec. 22 by city to McHugh Contracting Co., which submitted a bid for \$1,975. Cost estimated by City Engineer Raleigh was \$2,088.85.

SEWERAGE

Gainesville, Fla.—Bids will be asked about March for paving to cost \$25,000, and sanitary sewers, \$13,000. G. H. Cairns is City Engr.

Jacksonville, Fla.—Councilman Frank Owen's bill providing for expenditure of \$14,890.97 in sewers and drains, all of which run through property of Commodore Point Terminal Co., was passed Dec. 21.

Jacksonville, Fla.—Reported municipal improvements bonds amounting to \$125,000 will be sold Dec. 29 by Board of Bond Trustees for sewers and drains.

Patchogue, L. I., N. Y.—State has approved plans for proposed sewage disposal plant.

Buffalo, N. Y.—Frank C. Tolles, Dist. Engineer, of International Joint Commission, has submitted a report on Buffalo sewage, recommending expenditure of \$3,500,000 for improvements in method of disposing of sewage.

Charlotte, N. Y.—Town is discussing construction of new sewerage system.

Kane, Pa.—Borough is contemplating extending sewerage system.

Seattle, Wash.—The city engineer was instructed Dec. 21 to prepare specifications for sewer pipe, to be submitted to Board at later date.

CONTRACTS AWARDED.

Boston, Mass.—Dec. 15 by Board Public Works for constructing Davenport Brook sewer to William J. Brady, West Roxbury, \$29,871. Other bidders were: J. J. Coughlin Co., 43 Tremont St., Boston, \$31,408; Antony Cefalo, 316 Belgrade Ave., Boston, \$31,786.

New Bedford, Mass.—By Board of Aldermen to American Sewer Pipe Co., 30 Church St., New York, at \$9,115, for furnishing segment sewer blocks.

South St. Paul, Minn.—By J. N. Stevenson, City Auditor, for constructing 4,300 ft. 15 to 36-in. sewer to Tanner Bros., St. Paul, \$24,490. Other bidders were: E. T. Webster, St. Paul, \$25,712; J. Connolly, St. Paul, \$25,712; Pastoret Construction Co., Duluth, \$27,444.

Buffalo, N. Y.—To J. F. Stabell Contracting Co., 1127 Niagara St., for constructing an extension to Swan St. sewer at \$110,000.

New York, N. Y.—To Melrose Construction Co., 147 East 125th St., for altering and improving sewers at Cedar and Pine Sts., between Nassau St. and Broadway, and Broadway, between Pine and Cedar Sts., at following bid: Brick sewer, lin. ft. at \$14.25; pipe sewer, lin. ft. at \$10.50; total, \$10,228.50.

Providence, R. I.—To Prudden-Winslow Co., New York, at \$6,000.82 net for sewer pipe.

WATER SUPPLY

Woodland, Cal.—City Council Dec. 20 decided to call at an early date an election to vote upon issuing bonds of \$45,000 for the improvement of municipal water system and \$5,000 for construction of a municipal ice plant. The \$45,000 bond issue for improvement of water system will provide for installation of a 10-in. high-pressure pump operated by a 150-horsepower motor, a 120,000-gal. water tower 100 ft. high and laying of additional mains. City Engineer C. E. Arnold submitted an estimate placing the cost of proposed ice plant at \$5,000.

South Bend, Ind.—Water works bonds amounting to \$25,000 will be sold Dec. 29 by City Comptroller.

Elkhart, Kan.—W. B. Rollins, consulting engineer of Kansas City, was in Elkhart this week, in consultation with members of City Council relative to taking charge of installing of water-works system, providing bonds carry. Mr. Rollins made preliminary survey of city, marking streets where water mains will be located and marking where fire plugs will be. He says plant can be put in for amount of bonds, \$17,500. There will be about three miles of mains and laterals, and they will vary in size from 8 ins. to 2 ins.

Liverpool, N. Y.—Construction of water works costing \$45,000 is being discussed.



There is a revelation for you in "WATCH DOG" literature

GAMON METER CO.

Main Office and Works
282-296 South St., Newark, N. J.

A good meter design means that perfect balance of parts which is the result of research. Gears, register, disk, stuffing box—every part must be the result of mathematically studied care and foresight.

"WATCH DOG"

meters not only have such design, but the design is made real in honest materials and honest workmanship. It is a good meter on paper and a good meter in the shop—that's why it is a good meter on the service.

WHEN YOU WRITE ADVERTISERS YOU WILL
DO THEM AND US A FAVOR BY MENTIONING
MUNICIPAL JOURNAL



The following makers of Cast Iron Pipe are independent of each other and competitors; inquiries may be sent to any or all of these with assurance of prompt and full response:

Glamorgan Pipe & Foundry Co.	U. S. Cast Iron Pipe & Fdy. Co.
Lynchburg, Va.	Philadelphia, Pa.
Lynchburg Foundry Co.	American Cast Iron Pipe Co.
Lynchburg, Va.	Birmingham, Ala.
Massillon Iron & Steel Co.	James B. Clow & Sons
Massillon, Ohio	Chicago, Ill.
Donaldson Iron Co.	
Emaus, Lehigh Co., Pa.	



"RENSSELAER" VALVES

All Sizes
All Pressures
All Purposes

"COREY" FIRE HYDRANTS

Valve Boxes
Indicator Posts
Air Valves

RENSSELAER VALVE CO.

GENERAL OFFICES, TROY, N. Y.

NEW YORK, 180 Broadway
SEATTLE, 512 Colman Bldg.

CHICAGO, 1108-9 Monadnock Bldg.
PITTSBURGH, 1016 House Bldg.

GRAVITY and
PRESSURE

FILTERS

Send for
Bulletin No. 15

Hypochlorite Apparatus and Water Softening Plants.

THE NEW YORK CONTINENTAL JEWELL FILTRATION COMPANY

111 W. Monroe St., CHICAGO

313 E. Tenth St., KANSAS CITY

15 Broad St., NEW YORK

KEEP YOUR PLANT UP TO DATE

Good results depend on good equipment. This page is a directory of **good** water works equipment. These firms offer products to increase the efficiency of your system and to save money in your plant. When you need equipment—the most improved and the best—these firms are ready to put their experience at your disposal.

If there is any equipment you cannot find on this page or in the paper, write us and we will give you the names of the manufacturers. Address

Information Bureau

MUNICIPAL JOURNAL

50 Union Square, New York

AMERICAN and NEW NIAGARA WATER METERS



SPECIFICATIONS

Dirt and Sand Proof Submerged Bearings. Reinforced Measuring Disc. Jewel and Pivot Bearing Gears. Regulator for Pressures. Only Seven Submerged Working Parts. These and other features explained in new catalog.

BUFFALO METER CO.

Established 1892

290 Terrace, Buffalo, N. Y.

NEW YORK	CHICAGO
Keystone and Eureka	
Water Meters	
Pittsburgh Meter Co.	SEATTLE
East Pittsburgh, Pa.	
KANSAS CITY	

BUYERS' CLASSIFIED DIRECTORY

of Names and Addresses of the Most Reliable Firms from Whom to Buy Materials, Appliances and Machinery Needed by Municipal Departments and Contractors

CEMENT

Allentown Portland Cement Co., Allentown, Pa.
Atlas Portland Cement Co., 30 Broad St., N. Y.
Lehigh Portland Cement Co., Allentown, Pa.
Vulcanite Portland Cement Co., 8 West 40th St., New York.

CONTRACTORS' EQUIPMENT

CONCRETE FORMS.
*Blaw Steel Construction Co., Pittsburgh, Pa.
DRYERS, SAND, STONE, SEWERAGE AND GARBAGE.
American Process Co., 68 William St., N. Y.

MOTOR TRUCKS, DUMPING.
*General Motors Truck Co., Pontiac, Mich.
*Federal Motor Truck Co., Detroit, Mich.
*Kissel Motor Car Co., 570 Kissel Ave., Hartford, Wis.

PUMPS, DIAPHRAGM.
*Bend, Harold L. Co., 383 Atlantic Av., Boston.
*Parker, A. A. Waterford, N. Y.
*Tarrant Mfg. Co., 12 Maple Ave., Saratoga Springs, N. Y.

SAND AND GRAVEL WASHER.
James Maybury, 930 Clinton St., Clifton, N. J.

FIRE DEPT. EQUIPMENT

AERIAL TRUCKS.
*Boyd, James, & Bro., 25th and Wharton Sts., Philadelphia, Pa.

BELLS.
*New Departure Mfg. Co., Bristol, Conn.
COMBINATION CHEMICAL AND HOSE WAGONS.

*American-La France F. E. Co., Elmira, N. Y.
*Boyd, James & Bro., 25th & Wharton Sts., Philadelphia, Pa.
*Kissel Motor Car Co., 570 Kissel Ave., Hartford, Wis.

FIRE ALARM SYSTEMS.
*Loper Fire Alarm Co., Stonington, Conn.
*Sireno Co., Inc., 20 Rose St., New York.
*Union Water Meter Co., Worcester, Mass.

FIRE ALARM TELEGRAPH.
*Gamewell Fire Alarm Tele. Co., Grand Central Terminal, N. Y.

FIRE HOSE.
*Eureka Fire Hose Co., 27 Barclay St., N. Y.
*Fabric Fire Hose Co., Duane & Church Sts., New York.
*Gutta Percha & Rubber Mfg. Co., 128 Duane St., New York.

PUMPING ENGINES, GASOLENE.
*American-La France F. E. Co., Elmira, N. Y.
*Robinson Fire Apparatus Mfg. Co., St. Louis.

RUBBER TIRES.
*Dayton Rubber Mfg. Co., Dayton, O.
*Goodyear Tire & Rubber Co., Akron, O.

TRACTORS.
*Couple Gear Freight Wheel Co., Grand Rapids, Mich.

TRIPLE COMBINATION MOTOR.
*American-La France F. E. Co., Elmira, N. Y.
*Robinson Fire Apparatus Mfg. Co., St. Louis.

FOUNDATIONS

CONCRETE PILINGS.
MacArthur Concrete Pile & Foundation Co., 11 Pine St., N. Y.

MUNICIPAL BONDS

MANUFACTURERS.
Albert B. King & Co., Inc., 204 Broadway, N. Y.

PAVING MACHINERY

ASPHALT PLANTS.
*Cummer & Son Co., F. D., Cleveland, O.
*East Iron & Machine Co., Lima, O.
*Hetherington & Berner, Indianapolis, Ind.
*Warren Bros. Co., Boston, Mass.

BRICK TESTING MACHINES.
*Hetherington & Berner, Indianapolis, Ind.

CONCRETE MIXERS.
*Koehring Machine Co., Milwaukee, Wis.

HOT MIXERS.
*Koehring Machine Co., Milwaukee, Wis.

OIL DISTRIBUTORS.
*Kinney Mfg. Co., 3535 Washington St., Boston, Mass.

*Studebaker, South Bend, Ind.
PAVING MIXERS.
*Koehring Machine Co., Milwaukee, Wis.

ROAD GRADERS.
*Austin-Western Road Mach. Co., Chicago, Ill.
*Universal Road Mach. Co., Kingston, N. Y.

ROAD ROLLERS.
*Austin-Western Road Mach. Co., Chicago, Ill.
*Buffalo Steam Roller Co., Buffalo, N. Y.
*Kelly-Springfield Road Roller Co., Springfield, O.

*Universal Road Mach. Co., Kingston, N. Y.
SCRAPERS.

*Austin-Western Road Mach. Co., Chicago, Ill.
*Universal Road Mach. Co., Kingston, N. Y.

SPRINKLING WAGONS.
*Tiffin Wagon Co., Tiffin, O.

TAR KETTLES, ASPHALT HEATERS, ETC.

*Littleford Bros., Cincinnati, O.
*Tarrant Mfg. Co., Saratoga Spgs., N. Y.
*Warren Bros. Co., Boston, Mass.

PAVING MATERIALS

ASPHALT.
*Barber Asphalt Paving Co., Philadelphia, Pa.
*Indian Refining Co., 17 Battery Pl., N. Y.
*Pioneer Asphalt Co., Lawrenceville, Ill.
*Standard Oil Co., 26 Bway., New York, N. Y.
*U. S. Asphalt Refining Co., 90 West St., N. Y.
*Wadsworth Stone & Paving Co., Pittsburgh, Pa.

BINDERS.
*Baker, John Jr., 17 Battery Pl., New York.
*Barber Asphalt Paving Co., Land Title Bldg., Philadelphia, Pa.
*Barrett Mfg. Co., 17 Battery Pl., N. Y.
*Headley Good Roads Co., Thirtieth & Spruce Sts., Philadelphia, Pa.
*Indian Refining Co., 17 Battery Pl., N. Y.
*Pioneer Mfg. Co., Lawrenceville, Ill.
*Robeson Process Co., 18 E. 41st St., N. Y.
*Standard Oil Co., 26 Broadway, N. Y.
*United Gas Improvement Co., Broad & Arch Sts., Philadelphia, Pa.
*U. S. Asphalt Refining Co., 90 West St., N. Y.

BITUMINOUS PAVEMENTS.
*Amies Road Co., Easton, Pa.
*Bituminized Road Co., Kansas City, Mo.
*Barrett Mfg. Co., 17 Battery Pl., N. Y.
*United Gas Improvement Co., Broad & Arch Sts., Philadelphia, Pa.
*Wadsworth Stone & Paving Co., Pittsburgh, Pa.
*Warren Bros. Co., 59 Temple Pl., Boston.

BRICK.
*The Barr Clay Co., Streator, Ill.
*Bessemer Limestone Co., Youngstown, O.
*Clearfield Brick Mfg. Co., Clearfield, Pa.
*The Deckman-Duty Co., Sweetland Bldg., Cleveland, O.
*Globe Brick Co., E. Liverpool, O.
*Mack Mfg. Co., New Cumberland, W. Va.
*McAvoy Brick Co., 1341 Arch St., Phila., Pa.
*Metropolitan Paving Brick Co., Canton, O.
*Milton Brick Co., Milton, Pa.
*Nat. Paving Brick Mfrs.' Ass'n., Cleveland, O.
*Paterson Clay Products Co., Clearfield, Pa.
*Thornton Fire Brick Co., 909 Goff Bldg., Clarksburg, W. Va.

CURBS, STONE.

*Ohio Quarries Co., Cleveland, O.
EXPANSION JOINTS.

*Carey Mfg. Co., Phillip, Lockland, Cinn., O.
*Pioneer Asphalt Co., Lawrenceville, Ill.
*Trussed Concrete Steel Co., Youngstown, O.

GRANITE BLOCK.

*Granite Paving Block Mfrs. Assn., 54 Devonshire St., Boston, Mass.
JOINT PROTECTION (CONCRETE).

*Trussed Concrete Steel Co., Youngstown, O.

OIL.

*Baker, John Jr., 17 Battery Pl., N. Y.
*Barber Asphalt Paving Co., Land Title Bldg., Philadelphia, Pa.

*Indian Refining Co., 17 Battery Pl., N. Y.
*Pioneer Asphalt Co., Lawrenceville, Ill.
*Standard Oil Co., 26 Broadway, N. Y.
*U. S. Asphalt Refining Co., 90 West St., N. Y.

ROCK ASPHALT.

*Wadsworth Stone & Paving Co., Pittsburgh, Pa.

WOOD BLOCKS (CREOSOTED).

*Pittsburgh Wood Preserving Co., Pittsburgh, Pa.

*Republic Creosoting Co., Indianapolis, Ind.
*Wyckoff Pipe & Creosoting Co., 30 E. 42d St., N. Y.

PUBLIC LIGHTING

INSULATED WIRES AND CABLES.
*Okonite Co., 253 Broadway, N. Y.

LAMP POSTS.
*Mesker, Geo. L. & Co., Evansville, Ind.
*Sun Street Light Co., 1610 Market St., Canton, O.

UNDERGROUND CONDUITS.
*Johns-Manville, H. W., Co., Madison Ave. & 41st St., N. Y.

SCIENTIFIC INSTRUMENTS

ENGINEERS' TRANSITS AND LEVELS.
*Buff & Buff, Jamaica Pl. Sta., Boston, Mass.
*Heller & Brightly, 1124 Spring St., Phila., Pa.

PYROMETERS.
*Thwing Instrument Co., 440 No. 5th St., Phila., Pa.

SEWERAGE

CONCRETE FORMS.
*Blaw Steel Construction Co., Pittsburgh, Pa.

PIPE, CONCRETE.
*Lock Joint Pipe Co., Ampere, N. J.
*Parnley, W. C., 45 E. 17th St., N. Y.

PUMPS.
*Goulds Mfg. Co., Seneca Falls, N. Y.

SIPHONS AND FLUSH TANKS.
*Pacific Flush Tank Co., 149 Broadway, N. Y.

VITRIFIED FIRE CLAY SEWER TILE.
*East Ohio Sewer Pipe Co., Irondale, O.
*National Fire Proofing Co., Pittsburgh, Pa.
*Stratton Fire Clay Co., Empire, O.

STREET CLEANING

AND REFUSE DISPOSAL

CAN AND CARRIER.
*Tarrant Mfg. Co., 12 Maple Ave., Saratoga Springs, N. Y.

CARTS, SANITARY.

*Holzbog & Bro., Geo. H., Jeffersonville, Ind.

FLUSHERS.

*General Motors Truck Co., Pontiac, Mich.
*O'Neill Implement Co., Marseilles, Ill.
*Sanitary St. Flushing Mach. Co., St. Louis.
*Tiffin Wagon Co., Tiffin, O.

INCINERATORS.

*Morse Boulder Destructor Co., 39 Cortlandt St., N. Y.
*Stacy-Bates Co., McKnight Bldg., Minneapolis, Minn.

SANITARY ASH AND GARBAGE CANS.

*Eberhart & Son Co., 76th St & 1st Ave., N. Y.

SWEEPERS, HORSE-DRAWN.

*Studebaker, South Bend, Ind.

WATER WORKS

AIR COMPRESSORS.
*Gardner Governor Co., Quincy, Ill.
*Sullivan Mch. Co., 122 S. Mich. Ave., Chicago, Ill.

AIR LIFT PUMPS.
*Gardner Governor Co., Quincy, Ill.
*Sullivan Mch. Co., 122 S. Mich. Ave., Chicago, Ill.

ALUMINA.

*Pennsylvania Salt Co., Philadelphia, Pa.

CURB AND WASTE STOPS.

*Union Water Meter Co., Worcester, Mass.

FILTERS.

*N. Y. Continental Jewell Filtration Co., 15 Broad St., N. Y.

*Pittsburgh Filter Co., Pittsburgh, Pa.

FILTRATION PLANTS.

*Pittsburgh Filter Co., Pittsburgh, Pa.

FLAP VALVES.

*Coldwell-Wilcox Co., Newburgh, N. Y.

*Advertisers—See Alphabetical Index on last white page.

BUYERS' CLASSIFIED DIRECTORY

METERS.

- *Badger Meter Co., 261 Third St., Milwaukee.
- *Buffalo Meter Co., 290 Terrace, Buffalo, N. Y.
- *Gamon Meter Co., 282 South St., Newark, N. J.
- *Hersey Mfg. Co., South Boston, Mass.
- *Neptune Meter Co., 90 West St., N. Y.
- *Pittsburgh Meter Co., East Pittsburgh, Pa.
- *Thomson Meter Co., 110 Bridge St., Bklyn.
- *Union Water Meter Co., Worcester, Mass.

PIPE, CAST IRON.

- *Amer. Cast Iron Pipe Co., Birmingham, Ala.
- *Central Fdry. Co., 90 West St., N. Y.
- *Clow, Jas. B. & Sons, 544 S. Franklin St., Chicago, Ill.
- *Donaldson Iron Co., Emaus, Lehigh Co., Pa.
- *Fox, John & Co., 253 Broadway, N. Y.
- *Glamorgan Pipe & Fndy. Co., Lynchburg, Va.
- *Lynchburg Foundry Co., Lynchburg, Va.
- *Massillon Iron & Steel Co., Massillon, O.
- *U. S. Cast Iron Pipe & Foundry Co., Burlington N. J.

PUMPS.

- *Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- *Artesian Well & Supply Co., Providence, R. I.
- *Cook, A. D., Lawrenceburg, Ind.
- *Dayton Dick, Co., Quincy, Ill.
- *Goulds Mfg. Co., Seneca Falls, N. Y.

SHEAR VALVES.

- *Coldwell-Wilcox Co., Newburgh, N. Y.

SLEEVES AND VALVES.

- *Smith, A. P., Mfg. Co., East Orange, N. J.

SLUICE GATES.

- *Coldwell-Wilcox Co., Newburgh, N. Y.

STAND PIPES & WATER TOWERS.

- Tippett & Wood, Phillipsburg, N. J.

STERILIZING APPARATUS.

- *Electro Bleaching Gas Co., 24 Madison Ave., New York.

STRAINERS.

- *Cook, A. D., Lawrenceburg, Ind.

TAPPING MACHINES.

- *Smith, A. P., Mfg. Co., East Orange, N. J.

THAWING MACHINE.

- *The Burbank Thawing Machine Co., 24 Custom House St., Boston, Mass.

VALVES.

- *Rensselaer Valve Co., Troy, N. Y.

WATER LEVEL RECORDERS.

- Hydro Mfg. Co., Bullitt Bldg., Phila., Pa.

WATER MAIN CLEANING.

- Nat'l Water Main Cl'ng Co., 50 Church St., N. Y.

WATERPROOFING MATERIALS.

- *Johns-Manville, H. W., Co., Madison Ave. & 41st St., N. Y.


- *Stocker, F. William (Inc.), Hoboken, N. J.

WATER SOFTENING AND PURIFYING.

- *N. Y. Continental Jewell Filtration Co., 15 Broad St., N. Y.

WATER SUPPLY FROM WELL SYSTEMS.

- Boyd Eng. Co., Inc., 11 B'way, N. Y.



ENGRAVINGS
USED IN THIS
PUBLICATION
ARE MADE
by the
**MOSS
PHOTO
ENGRAVING CO.**
UNDERHILL BUILDING
438-448 W. 37TH ST.
NEW YORK
TELEPHONE 6267 GREELEY
ESTABLISHED 1871

ABSOLUTE RELIABILITY AND OPERATING ECONOMY ARE THE MOST ESSEN- TIAL REQUIREMENTS OF PUMPING ENGINES

The great number of Allis-Chalmers Pumping Engines in continuous service, 365 days a year, demonstrates their reliability.

Official duty tests and published annual reports of station operating costs prove their **HIGH ECONOMY.**

*Is There Any Municipal Problem
of Greater Importance
Than the Water Supply of a City?*

Allis-Chalmers Manufacturing Company

Pumping Engine Department, Milwaukee, Wis.

For all Canadian business refer to
Canadian Allis-Chalmers, Limited, Toronto, Ont.

FOREIGN REPRESENTATIVES

- Frank R. Perrot, 583 Hay Street, Perth, W. A.
- Frank R. Perrot, 284 Clarence St., Sydney, N. S. W.
- H. I. Keen, 732 Salisbury House, London Wall, E. C., England
- Mark R. Lamb, Huerfanos 1157, Casilla 2853, Santiago, Chile

Practical Books for Waterworks Men

Covering all Branches of Design, Construction and Maintenance

PUBLIC WATER SUPPLIES

By F. E. Turneure and H. L. Russell. The best book on the subject. \$5.

TREATISE ON HYDRAULICS

By Mansfield Merriman. Price \$4.

WATER WORKS MANAGEMENT AND MAINTENANCE

By W. D. Hubbard and W. Kiersted. Price \$4.

THE EXAMINATION OF WATER

By W. P. Mason. Price \$1.25.

ELEMENTS OF WATER BACTERIOLOGY

By S. C. Prescott. Price \$1.75.

THE VALUE OF PURE WATER

By George C. Whipple. Price \$1.

CLEAN WATER AND HOW TO GET IT

By Allen Hazen. Price \$1.50.

ORDER FROM

MUNICIPAL JOURNAL, 50 Union Square, New York

Practical Books for Water Works Men

The books described below are recommended
as covering all branches of

Water Works Designing, Construction and Maintenance

PUBLIC WATER SUPPLIES

By F. E. Turneaure, Professor Bridge and Sanitary Engineering, and H. L. Russell, Professor of Bacteriology, both of the University of Wisconsin.

This describes the requirements, resources and construction of works for public water supplies and is prepared especially for the engineer, superintendent or other technical man. A chapter on pumping machinery has been contributed by D. W. Meade. This is a reliable and up-to-date treatise on the whole field of water supply, and is believed to be the best book which has yet been brought out on this subject. It is in its second edition; contains about 800 pages. Price, \$5.

TREATISE ON HYDRAULICS

By Mansfield Merriman.

This is the ninth edition of a work which has been a standard text book on the subject of hydraulics for many years. The latest edition has been revised with the assistance of Professor Merriman's son, Thaddeus Merriman. 565 pages. Price, \$4.

WATER WORKS MANAGEMENT AND MAINTENANCE

By Winfield D. Hubbard and Wyncoop Kiersted.

Is probably the only book which deals to the extent of more than 400 pages solely with the operation of a water works system. It is, therefore, especially suitable for the superintendent or manager of a plant. The subject is treated from both the engineering and the business standpoint. Price, \$4.

For the Chemical and Bacteriological Analysis of water and the interpretation of such analyses, we have as standard works

THE EXAMINATION OF WATER

By Professor William P. Mason, of Rensselaer Polytechnic Institute; and

ELEMENTS OF WATER BACTERIOLOGY

By S. C. Prescott, Associate Professor of Industrial Microbiology, Massachusetts Institute of Technology, and C. E. A. Winslow, Associate Professor of Biology, College of the City of New York.

The former book is in its fourth edition. In 167 pages it deals with this subject principally from a sanitary standpoint, with brief reference, however, to mineral and other impurities of no sanitary import. Price, \$1.25. WATER BACTERIOLOGY is in its third edition. Contains about 270 pages, and while it pretends to deal with only the elements of the subject, these elements are treated in a thoroughly scientific manner by experts on the subject. Price, \$1.75.

For Non-Technical Officials or citizens generally who are interested in the subject, there are two excellent books

THE VALUE OF PURE WATER

By George C. Whipple, of Harvard University, and

CLEAN WATER AND HOW TO GET IT

By Allen Hazen, Consulting Water Works Engineer.

The purpose of the former book is to illustrate the fact that impure water affects not only the health and comfort of a community but also the individual pocketbooks of the people. It contains 80 pages and sells at \$1. Mr. Hazen's book is a brief explanation in non-technical terms of why water should be purified, and the more generally used methods and appliances for purifying it. Its object is to set forth first principles for those who have no expert knowledge of the subject. 174 pages. Price, \$1.50.

ORDER FROM

MUNICIPAL JOURNAL

50 Union Square

New York

Directory of Consulting Engineers Engaged in Municipal and Public Works

A ETNA ENGINEERING BUREAU

Civil Engineers, Surveys, Estimates, Valuations, Reports, etc. Particular attention given to street pavements, sewerage and water supply system. Surveys for steam and electric railways.
SPECIAL ASSESSMENT EXPERTS,
Suite 700, 17 North La Salle St., Chicago.
Telephone Franklin 898

Philadelphia, Pa., 907 Land Title Bldg.

ALBRIGHT & MEBUS

Civil and Sanitary Engineers.
Sewerage. Sewage Disposal, Town Planning.

ALVORD, JOHN W. CHAS. B. BURDICK

Consulting Engineers
Reports, Investigations, Plans and Specifications for Water Supplies, Water Purification, Water Power, Sewerage, Sewage Disposal.
Hartford Building CHICAGO

BLACK & VEATCH (Successors to Worley & Black)

Civil and Consulting Engineers
Sewerage, Water Supply, Water Purification, Sewage Disposal, Valuations. KANSAS CITY, MO., Inter-State Bldg

BROSSMAN, CHAS.

SPECIALIST
Waterworks, Sewerage, Sewage Disposal
Merchants' Bank Bldg. Indianapolis, Ind.

CAIRD, JAMES M.

Assoc. Am. Soc. C. E.
Chemist and Bacteriologist
Office and Laboratory,
271 RIVER STREET TROY, N. Y.
Water Analysis and Tests of Filter Plants

DOW & SMITH

CHEMICAL ENGINEERS
Consulting Paving Engineers
A. W. Dow, Ph.B. F. P. Smith, Ph.B.
Mem. Am. Inst. Ch. Engrs.
Mem. Am. Soc. Civ. Engrs.
Asphalt, Bitumens, Paving, Hydraulic Cement, Engineering Materials.
131-3 East 23d St. NEW YORK

DULUTH Engineering Co., The

W. B. PATTON, M. Am. Soc. C. E.
Ex-City Engineer, Duluth, Manager
MUNICIPAL ENGINEERS
Waterworks, Sewerage, Electric Lighting
Town Planning.
Suite 612-616 Palladio Bldg.
DULUTH, MINN.

FULLER, GEORGE W.

Hydraulic Engineer and Sanitary Expert
Water Supply and Purification, Sewerage and Drainage, Disposal of Sewage and Refuse, Investigations of Epidemics, Water Works, Valuations, Supervision of Construction and Operation.
Associate: James R. McClintock
170 BROADWAY NEW YORK CITY

HARDING, JAMES C.

Consulting Engineer & Sanitary Expert
Water Supply and Purification
Refuse Disposal, Sewerage and Sewerage Disposal, Investigations of Epidemics, Water Works Valuations
Supervision of Construction and Operation
170 Broadway, NEW YORK

HAZEN, WHIPPLE & FULLER

Consulting Hydraulic and Sanitary Engineers; Water Supply, Sewerage, Drainage, Valuations, Supervision of Construction and Operation.

ALLEN HAZEN G. C. WHIPPLE
W. E. FULLER F. F. LONGLEY
C. M. EVERETT L. N. BABBITT
30 East 42nd Street, New York City

HERING & GREGORY

Consulting Engineers & Sanitary Experts
Water Supply and Water Purification, Sewerage, Sewage Disposal and Refuse Disposal

Rudolph Hering John H. Gregory
170 Broadway, New York City

J. W. HOWARD

Consulting Engineer
Pavements and Roads
Specifications, Qualities of Materials, Chemical Analyses and Tests, Inspection, &c. 27 Years' Experience.
1 Broadway, NEW YORK

KNOWLES, MORRIS

M. Am. Soc. C. E.
Consulting Municipal Engineer
Planning and Construction of Industrial Towns
Water Supply, Water Purification, Sewerage and Sewage Disposal
2541 Oliver Bldg. Pittsburgh, Pa.

Kimberly, A. Elliott

Hydraulic and Sanitary Engineer
3 East Long Street,
Columbus, Ohio
Sewage Disposal
Water Purification
Industrial Waste Treatment

LEDERLE & PROVOST

SANITARY EXPERTS AND
HYDRAULIC ENGINEERS
Water Supply, Sewage Purification
Andrew J. Provost, C. E., New York City
A. B. Hansen, B. S., 39-41 West 38th St.

MAURY, DABNEY H.

Member Am. Soc. C. E. and
Mem. Soc. M. E.
Investigations, Reports, Design and Superintendence Water Works, Power Plants, Sewerage, Land Drainage and Appraisal of Public Utilities.
1137-8 Monadnock Block Chicago, Ill.

MORSE, WILLIAM F.

Consulting Sanitary Engineer
90 West St. New York
Surveys, Reports, Specifications, Proposal Forms for Disposal of Waste of Municipalities, Institutions and Business Establishments, Designs for Special Furnaces for any purpose. Expert Investigation and Reports on Any Question of Waste Collection or Disposal.

Pollock, Clarence D.

M. Am. Soc. C. E.
Consulting Engineer
Pavements, Drainage, Specifications, Municipal Works
Park Row Building New York

Potter, Alexander

50 Church St.
New York City
Civil and Sanitary Engineer
Specialties:
Water Supply, Sewerage and Pavements

POTTS, CLYDE

Civil and Sanitary Engineer
Sewerage and Sewage Disposal Works
Hydraulic, Water Works, Filtration
Reports, Plans and Estimates

STEVENS, HARRY

Civil and Mechanical Engineer
Water Works, Sewerage and Sewage Disposal, Power Plants, Factories, Steam and Electric Railways, Surveys, Examinations, Reports and General Engineering Work.
Union Trust Bldg. WASHINGTON, D. C.

TAYLOR, HENRY W.

HYDRAULIC & SANITARY ENGINEER
Water Supply Water Purification
Sewerage Pumping Plants
Sewage Disposal Drainage
Reports, Estimates, Plans, Supervision of Construction and Operation

THORNE, J. G. CONSULTING ENGINEER

Water Supply, Sewerage, Pavements
Special Assessments
Howes Block Clinton, Iowa

Proposal Advertising

Municipal officials will serve their constituents well by seeing that PROPOSALS FOR MUNICIPAL IMPROVEMENTS of all kinds are inserted in

Municipal Journal

Publication Office:
50 Union Square, New York

APPROVAL

HERSEY DETECTOR METER

The Hersey Detector Meter has been accepted for eleven years in 3, 4, 6, 8, 10 and 12" sizes without any restrictions or conditions of any kind by every Insurance Company, Stock and Mutual, doing business in the United States, and by the Water Departments and Water Companies in more than 500 Cities and Towns for use on over 3,000 Fire Services protecting nearly \$2,000,000,000 worth of Insured Property

HERSEY MANUFACTURING COMPANY

BOSTON COLUMBUS, O. SAN FRANCISCO
NEW YORK PHILADELPHIA LOS ANGELES
CHICAGO ATLANTA PORTLAND, ORE.

JUST ISSUED

MUNICIPAL ACCOUNTING

(Ronald Accounting Series)

By DeWitt C. Eggleston, C. P. A.

Department of Finance, City of New York

This is the most definite, thorough book on municipal accounting published in this country.

It gives the method for handling every kind of financial transaction of a city, illustrated by a complete set of city accounts, worked out with specific figures.

Every journal entry, ledger account, balance sheet and form is right where you can put your hand on it and trace each transaction from its origin, through the books, into the financial statement. You have the whole procedure right in this volume.

1914. 456 Pages. Half Leather. \$4 Prepaid. Subject to 5 days' examination and return if not satisfactory.

MUNICIPAL JOURNAL
50 UNION SQUARE NEW YORK

Index to Advertisements

A	Page	L	Page
Aetna Engineering Bureau.....	33	Lederle & Provost.....	33
Albright & Mebus.....	33	Lehigh Portland Cement Co.....	10
Allis-Chalmers Mfg. Co.....	31	Littleford Bros.....	2
Alvord & Burdick.....	33	Lock Joint Pipe Co.....	—
American Cast Iron Pipe Co.....	29	Loper Fire Alarm Co..... o.a.m.	—
American-La France Fire Eng. Co.	7	Lynchburg Foundry Co.....	29
American Tel. & Tel. Co.....	—		
Amies Road Co.....	—		
Artesian Well & Supply Co., o.a.m.	—		
Austin Western Road Mach'y Co.	10		
		M	
B		Mack Mfg. Co.....	3
Badger Meter Mfg. Co.... o.a.m.	—	Marine Metal & Supply Co.....	28
Baker, John, Jr..... o.a.m.	—	Martinique Hotel.....	—
Barber Asphalt Paving Co.....	—	Masillon Iron and Steel Co., The	29
Barr Clay Co..... o.a.m.	—	McAvoy Vit. Brick Co.... o.a.m.	—
Barrett Mfg. Co.....	—	McWane Pipe Works.....	29
Bessemer Limestone Co.....	3	Maury, Dabney H.....	33
Bituminized Road Co..... o.a.m.	—	Mesker, Geo. L. & Co.... o.a.m.	—
Black & Veatch.....	33	Metropolitan Paving Brick Co....	3
Blaw Steel Const. Co.....	—	Milton Brick Co.....	3
Bond, Harold L., Co.....	6	Morse, W. F.....	33
Boyd, James & Bro., Inc., e.o.w.	9	Moss Photo-Engraving Co.....	31
Brossman, Chas.....	33		
Buff & Buff.....	27	N	
Buffalo Meter Co.....	29	National Fire Proofing Co.....	—
Buffalo Steam Roller Co.....	4	National Paving Brick Mfg. Ass'n	—
Burbank Thawing Mch. Co.....	35	Neptune Meter Co.....	36
		New Departure Mfg. Co.....	9
C		New York Continental Jewell Fil-	
Caird, James M.....	33	tration Co.....	29
Carey, Philip, Co..... o.a.m.	—		
Cast Iron Pipe Mfrs.....	29	O	
Central Fdy. Co.....	—	Ohio Quarries Co..... o.a.m.	—
Clearfield Brick Mfg. Co.....	3	Okonite Co., The..... o.a.m.	—
Clow, James B., & Sons.....	29	O'Neil Implement Co.....	7
Coldwell-Wilcox Co.....	35		
Cook, A. D., o.a.m.	—		
Couple Gear Freight Wheel Co...	9		
Cumberland Hotel.....	7		
Cummer, F. D., & Son Co.....	2		
		P	
D		Pacific Flush Tank Co.... e.o.w.	—
Dayton Dick Co.....	—	Parker, A. A..... e.o.w.	6
Dayton Rubber Mfg. Co.....	—	Parmley, W. C..... e.o.w.	—
Deckman Duty Brick Co., o. a. m.	—	Paterson Clay Products Co.....	3
Donaldson Iron Co.....	29	Pennsylvania Salt Mfg. Co.....	35
Dow & Smith.....	33	Pioneer Asphalt Co.....	10
Duluth Engineering Co.....	33	Pittsburgh Filter Co.....	35
		Pittsburgh Meter Co.....	29
E		Pittsburgh Wood Preserving Co...	4
East Iron and Mach. Co.....	4	Pollock, C. D.....	33
Eberhart, M. & Son Co.....	—	Potter, Alexander.....	33
Electro Bleaching Gas Co.....	35	Pot s Clyde.....	33
Eureka Fire Hose Mfg. Co.....	9		
		F	
F		Fabric Fire Hose Co.....	9
Fabric Fire Hose Co.....	9	Republic Creosoting Co.....	—
Federal Motor Truck Co.....	—	Rensselaer Valve Co.... e.o.w.	29
Fox, John, & Co., o. a. m.	—	Robeson Process Co.....	2
Fuller, Geo. W.....	33	Robinson Fire Apparatus Co....	—
G		S	
Gamewell Fire Alarm Teleg. Co..	9	Sanitary Street Flushing Machine	
Gamon Meter Co.....	29	Co.....	7
Gardner Governor Co.... e.o.w.	36	Smith, A. P., Mfg. Co.....	35
General Motors Truck Co.....	5	Stacy-Bates Co.....	—
Glamorgan Pipe & Foundry Co..	29	Standard Oil Co.....	10
Globe Brick Co.....	3	Stevens, Harry.....	33
Goodyear Tire & Rubber Co.....	—	Stratton Fire Clay Co.....	6
Goulds Mfg. Co.....	35	Studebaker Corporation, The....	—
Granite Paving Block Mfrs.' Assn.	—	Sullivan Machinery Co.....	—
of the U. S.....	—	Sun Street Light Co.....	—
Gutta Percha & Rubber Mfg. Co.	—		
		H	
H		Harding, James C.....	33
Harding, James C.....	33	Hazen & Whipple.....	33
Hazen & Whipple.....	33	Headley Good Roads Co.....	27
Headley Good Roads Co.....	27	Hering, Rudolph, & Gregory, John	33
Hering, Rudolph, & Gregory, John	33	Hersey Mfg. Co.....	34
Hersey Mfg. Co.....	34	Hetherington & Berner.....	34
Hetherington & Berner.....	34	Holzboog & Bro., Geo. H.....	27
Holzboog & Bro., Geo. H.....	27	Howard, J. W.....	33
Howard, J. W.....	33		
		I	
I		Indian Refining Co., Inc.....	27
Indian Refining Co., Inc.....	27	InterOcean Oil Co.....	2
InterOcean Oil Co.....	2		
		J	
J		Johns-Manville Co., H. W.....	2
Johns-Manville Co., H. W.....	2		
		K	
K		Kelly Springfield Road Roller Co.	—
Kelly Springfield Road Roller Co.	—	Kimberley, A. Elliott.....	33
Kimberley, A. Elliott.....	33	Kinney Mfg. Co.....	—
Kinney Mfg. Co.....	—	Kiesel Motor Car Co.....	—
Kiesel Motor Car Co.....	—	Knowles, Morris.....	33
Knowles, Morris.....	33	Koehring Machine Co.....	—
Koehring Machine Co.....	—		
		L	
L		Lederle & Provost.....	33
Lederle & Provost.....	33	Lehigh Portland Cement Co.....	10
Lehigh Portland Cement Co.....	10	Littleford Bros.....	2
Littleford Bros.....	2	Lock Joint Pipe Co.....	—
Lock Joint Pipe Co.....	—	Loper Fire Alarm Co..... o.a.m.	—
Loper Fire Alarm Co..... o.a.m.	—	Lynchburg Foundry Co.....	29
Lynchburg Foundry Co.....	29		
		M	
M		Mack Mfg. Co.....	3
Mack Mfg. Co.....	3	Marine Metal & Supply Co.....	28
Marine Metal & Supply Co.....	28	Martinique Hotel.....	—
Martinique Hotel.....	—	Masillon Iron and Steel Co., The	29
Masillon Iron and Steel Co., The	29	McAvoy Vit. Brick Co.... o.a.m.	—
McAvoy Vit. Brick Co.... o.a.m.	—	McWane Pipe Works.....	29
McWane Pipe Works.....	29	Maury, Dabney H.....	33
Maury, Dabney H.....	33	Mesker, Geo. L. & Co.... o.a.m.	—
Mesker, Geo. L. & Co.... o.a.m.	—	Metropolitan Paving Brick Co....	3
Metropolitan Paving Brick Co....	3	Milton Brick Co.....	3
Milton Brick Co.....	3	Morse, W. F.....	33
Morse, W. F.....	33	Moss Photo-Engraving Co.....	31
Moss Photo-Engraving Co.....	31		
		N	
N		National Fire Proofing Co.....	—
National Fire Proofing Co.....	—	National Paving Brick Mfg. Ass'n	—
National Paving Brick Mfg. Ass'n	—	Neptune Meter Co.....	36
Neptune Meter Co.....	36	New Departure Mfg. Co.....	9
New Departure Mfg. Co.....	9	New York Continental Jewell Fil-	
New York Continental Jewell Fil-		tration Co.....	29
		O	
		Ohio Quarries Co..... o.a.m.	—
		Okonite Co., The..... o.a.m.	—
		O'Neil Implement Co.....	7
		P	
		Pacific Flush Tank Co.... e.o.w.	—
		Parker, A. A..... e.o.w.	6
		Parmley, W. C..... e.o.w.	—
		Paterson Clay Products Co.....	3
		Pennsylvania Salt Mfg. Co.....	35
		Pioneer Asphalt Co.....	10
		Pittsburgh Filter Co.....	35
		Pittsburgh Meter Co.....	29
		Pittsburgh Wood Preserving Co...	4
		Pollock, C. D.....	33
		Potter, Alexander.....	33
		Pot s Clyde.....	33
		F	
		Fabric Fire Hose Co.....	9
		Republic Creosoting Co.....	—
		Rensselaer Valve Co.... e.o.w.	29
		Robeson Process Co.....	2
		Robinson Fire Apparatus Co....	—
		S	
		Sanitary Street Flushing Machine	
		Co.....	7
		Smith, A. P., Mfg. Co.....	35
		Stacy-Bates Co.....	—
		Standard Oil Co.....	10
		Stevens, Harry.....	33
		Stratton Fire Clay Co.....	6
		Studebaker Corporation, The....	—
		Sullivan Machinery Co.....	—
		Sun Street Light Co.....	—
		H	
		Harding, James C.....	33
		Hazen & Whipple.....	33
		Headley Good Roads Co.....	27
		Hering, Rudolph, & Gregory, John	33
		Hersey Mfg. Co.....	34
		Hetherington & Berner.....	34
		Holzboog & Bro., Geo. H.....	27
		Howard, J. W.....	33
		I	
		Indian Refining Co., Inc.....	27
		InterOcean Oil Co.....	2
		J	
		Johns-Manville Co., H. W.....	2
		K	
		Kelly Springfield Road Roller Co.	—
		Kimberley, A. Elliott.....	33
		Kinney Mfg. Co.....	—
		Kiesel Motor Car Co.....	—
		Knowles, Morris.....	33
		Koehring Machine Co.....	—
		L	
		Lederle & Provost.....	33
		Lehigh Portland Cement Co.....	10
		Littleford Bros.....	2
		Lock Joint Pipe Co.....	—
		Loper Fire Alarm Co..... o.a.m.	—
		Lynchburg Foundry Co.....	29
		M	
		Mack Mfg. Co.....	3
		Marine Metal & Supply Co.....	28
		Martinique Hotel.....	—
		Masillon Iron and Steel Co., The	29
		McAvoy Vit. Brick Co.... o.a.m.	—
		McWane Pipe Works.....	29
		Maury, Dabney H.....	33
		Mesker, Geo. L. & Co.... o.a.m.	—
		Metropolitan Paving Brick Co....	3
		Milton Brick Co.....	3
		Morse, W. F.....	33
		Moss Photo-Engraving Co.....	31
		N	
		National Fire Proofing Co.....	—
		National Paving Brick Mfg. Ass'n	—
		Neptune Meter Co.....	36
		New Departure Mfg. Co.....	9
		New York Continental Jewell Fil-	
		tration Co.....	29
		O	
		Ohio Quarries Co..... o.a.m.	—
		Okonite Co., The..... o.a.m.	—
		O'Neil Implement Co.....	7
		P	
		Pacific Flush Tank Co.... e.o.w.	—
		Parker, A. A..... e.o.w.	6
		Parmley, W. C..... e.o.w.	—
		Paterson Clay Products Co.....	3
		Pennsylvania Salt Mfg. Co.....	35
		Pioneer Asphalt Co.....	10
		Pittsburgh Filter Co.....	35
		Pittsburgh Meter Co.....	29
		Pittsburgh Wood Preserving Co...	4
		Pollock, C. D.....	33
		Potter, Alexander.....	33
		Pot s Clyde.....	33
		F	
		Fabric Fire Hose Co.....	9
		Republic Creosoting Co.....	—
		Rensselaer Valve Co.... e.o.w.	29
		Robeson Process Co.....	2
		Robinson Fire Apparatus Co....	—
		S	
		Sanitary Street Flushing Machine	
		Co.....	7
		Smith, A. P., Mfg. Co.....	35
		Stacy-Bates Co.....	—
		Standard Oil Co.....	10
		Stevens, Harry.....	33
		Stratton Fire Clay Co.....	6
		Studebaker Corporation, The....	—
		Sullivan Machinery Co.....	—
		Sun Street Light Co.....	—
		H	
		Harding, James C.....	33
		Hazen & Whipple.....	33
		Headley Good Roads Co.....	27
		Hering, Rudolph, & Gregory, John	33
		Hersey Mfg. Co.....	34
		Hetherington & Berner.....	34
		Holzboog & Bro., Geo. H.....	27
		Howard, J. W.....	33
		I	
		Indian Refining Co., Inc.....	27
		InterOcean Oil Co.....	2
		J	
		Johns-Manville Co., H. W.....	2
		K	
		Kelly Springfield Road Roller Co.	—
		Kimberley, A. Elliott.....	33
		Kinney Mfg. Co.....	—
		Kiesel Motor Car Co.....	—
		Knowles, Morris.....	33
		Koehring Machine Co.....	—
		L	
		Lederle & Provost.....	33
		Lehigh Portland Cement Co.....	10
		Littleford Bros.....	2
		Lock Joint Pipe Co.....	—
		Loper Fire Alarm Co..... o.a.m.	—
		Lynchburg Foundry Co.....	29
		M	
		Mack Mfg. Co.....	3
		Marine Metal & Supply Co.....	28
		Martinique Hotel.....	—
		Masillon Iron and Steel Co., The	29
		McAvoy Vit. Brick Co.... o.a.m.	—
		McWane Pipe Works.....	29
		Maury, Dabney H.....	33
		Mesker, Geo. L. & Co.... o.a.m.	—
		Metropolitan Paving Brick Co....	3
		Milton Brick Co.....	3
		Morse, W. F.....	33
		Moss Photo-Engraving Co.....	31
		N	
		National Fire Proofing Co.....	—
		National Paving Brick Mfg. Ass'n	—
		Neptune Meter Co.....	36
		New Departure Mfg. Co.....	9
		New York Continental Jewell Fil-	
		tration Co.....	29
		O	
		Ohio Quarries Co..... o.a.m.	—
		Okonite Co., The..... o.a.m.	—
		O'Neil Implement Co.....	7
		P	
		Pacific Flush Tank Co.... e.o.w.	—
		Parker, A. A..... e.o.w.	6
		Parmley, W. C..... e.o.w.	—
		Paterson Clay Products Co.....	3
		Pennsylvania Salt Mfg. Co.....	35
		Pioneer Asphalt Co.....	10
		Pittsburgh Filter Co.....	35
		Pittsburgh Meter Co.....	29
		Pittsburgh Wood Preserving Co...	4
		Pollock, C. D.....	33
		Potter, Alexander.....	33
		Pot s Clyde.....	33
		F	
		Fabric Fire Hose Co.....	9
		Republic Creosoting Co.....	—
		Rensselaer Valve Co.... e.o.w.	29
		Robeson Process Co.....	2
		Robinson Fire Apparatus Co....	—
		S	
		Sanitary Street Flushing Machine	
		Co.....	7
		Smith, A. P., Mfg. Co.....	35
		Stacy-Bates Co.....	—
		Standard Oil Co.....	10
		Stevens, Harry.....	33
		Stratton Fire Clay Co.....	6
		Studebaker Corporation, The....	—
		Sullivan Machinery Co.....	—
		Sun Street Light Co.....	—
		H	
		Harding, James C.....	33
		Hazen & Whipple.....	33
		Headley Good Roads Co.....	27
		Hering, Rudolph, & Gregory, John	33
		Hersey Mfg. Co.....	34
		Hetherington & Berner.....	34
		Holzboog & Bro., Geo. H.....	27
		Howard, J. W.....	33
		I	
		Indian Refining Co., Inc.....	27
		InterOcean Oil Co.....	2
		J	
		Johns-Manville Co., H. W.....	2
		K	
		Kelly Springfield Road Roller Co.	—
		Kimberley, A. Elliott.....	33
		Kinney Mfg. Co.....	—
		Kiesel Motor Car Co.....	—
		Knowles, Morris.....	33
		Koehring Machine Co.....	—
		L	
		Lederle & Provost.....	33
		Lehigh Portland Cement Co.....	10
		Littleford Bros.....	2
		Lock Joint Pipe Co.....	—
		Loper Fire Alarm Co..... o.a.m.	—
		Lynchburg Foundry Co.....	29
		M	
		Mack Mfg. Co.....	3
		Marine Metal & Supply Co.....	28
		Martinique Hotel.....	—

WATER WORKS EQUIPMENT

Complete Sterilization of Your Water Supply Can Be Effected at a Low Cost

Whether your water works are large or small you can secure immunity from Typhoid epidemics

LIQUID CHLORINE

The Only 100 Per Cent. Sterilizing Agent

insures the permanent destruction of the bacteria, algae and other organic growths.

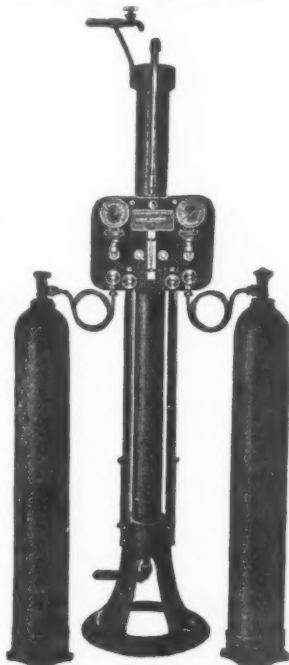
It leaves no odor, taste or sludge in the treated water and is unfailingly reliable.

All labor costs for treating your water or sewage eliminated.

INSTALLATION COSTS LESS.

We are the pioneer manufacturers of liquid chlorine and will gladly give you the benefit of our experience.

Write for our booklet "Perfect Sterilization."



Model "C" Meter Type

Electro Bleaching Gas Co.
24 Madison Avenue - New York City

CHLORIDE OF LIME

AND

LIQUID CHLORINE

FOR

Water and Sewage Purification

Pennsylvania Salt Mfg. Co.

PHILADELPHIA, PA.

Try this Tapping Machine at our Risk

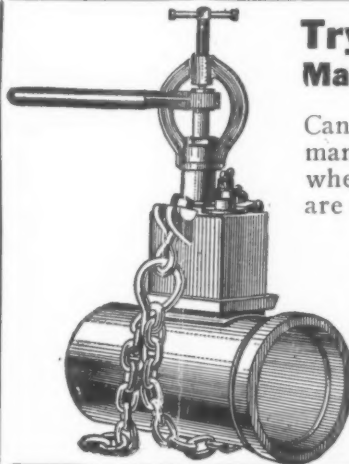
Can be carried by one man—a great advantage when you find openings are to be made.

Let us send one and a few samples of our Brass goods on trial.

See Sweet's Catalogue, Engineering Edition, for Details and Particulars.

The A. P. Smith Mfg. Co.

EAST ORANGE, N. J.



THAW OUT!

Fire Hydrants, Water Pipes, Sewers, Conduits, Underground!

BURBANK THAWING MACHINE

makes it easy. Over 100 in successful use. Write for list of users and Catalogue

The Burbank Thawing Machine Co., 22 CUSTOM HOUSE ST. BOSTON, MASS.

400,000,000 MILLION

Gallons of PURE WATER furnished by PITTSBURGH FILTER PLANTS

Nearly 100 Cities Supplied.

Gauges, Controllers, Operating Tables, Hypo, Plants. Everything for Pure Water

PITTSBURGH FILTER MFG. CO.

KANSAS CITY, MO.

PITTSBURGH, PA.

WILCOX SHEAR VALVES

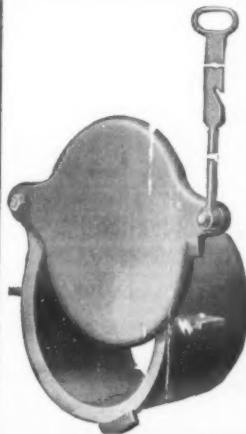
We also Manufacture

SLUICE, HEAD & PENSTOCK GATES

FLAP VALVES and FLEXIBLE JOINTS

Coldwell-Wilcox Co.

P. O. Box 574, Newburgh, N. Y.



GOULDS PUMPS

FOR EVERY SERVICE

THE GOULDS M'F'G. CO., SENECA FALLS, N.Y.

KING DISC METERS

Evolved From Fifty Years Meter Building Experience

King Meters stand strain of heavy duty.

King Meters have large Discs, thus nutations, compared with other makes, few to Cubic Foot, consequently wear less.

King Meters have all working parts, excepting Register assembled in single unit, rendering them accessible without removing Meter from service pipe.

King Meters operate Noiselessly.

King Meter Workmanship and Material fully Guaranteed.

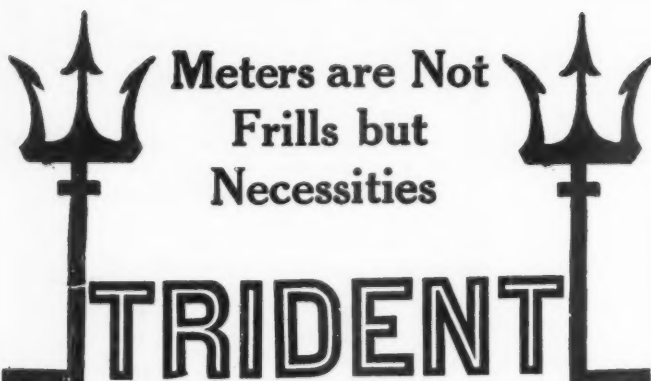
Write for

Catalog Now

UNION WATER
METER CO.



WORCESTER
MASS.



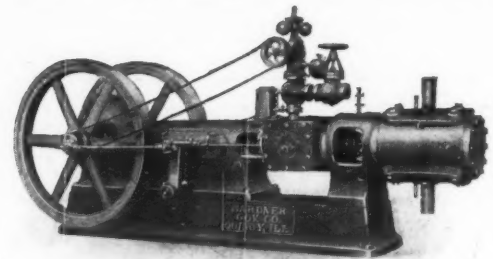
The water committee and superintendent who think that meters are not necessary, are fads or are money-wasters, should try metering a number of services and watching the results. They will find that meters reduce waste.

Trident meters have demonstrated this in city after city. Tridents put money in the city treasury.

*Have you read the book "Water Meters" by the public utility expert, Prof. Edward W. Bemis?
Ask us for a copy now*

NEPTUNE METER CO.
90 West Street New York

AIR COMPRESSORS



For every service there's a

GARDNER

Vertical or Horizontal Air Compressor

Compressors are enclosed, self-oiled, high speed, large capacity. Equipped with light, flexible sheet steel valves which seat quietly, and without wear.

Tell us your compressed air problems and we will gladly submit complete information.

The Gardner Governor Company
136 Williamson Street, Quincy, Illinois

Makers of the Gardner line of Governors, Steam and Power Pumps, Horizontal and Vertical Air Compressors.

"Let those now love who've never loved before,
And those who always loved now love the more."



Long
Life.

Lasting
Accuracy.

All parts
interchange-
able.

Maintenance
cost nominal

Their merits have made meter systems popular.

A good article is always worth the price. All improvements which the tests of time and long service show to be requisite in a Perfect Water Meter are embodied in the Lambert.

ONE MODEL ONLY

Made in all sizes, 3/4" to 6", of best bronze Composition throughout, fitted with Unbreakable reinforced disc-pistons.

*Illustrated Price List on Application
Address Dept. C.*

THOMSON METER CO.
100-110 BRIDGE STREET BROOKLYN, N. Y.

